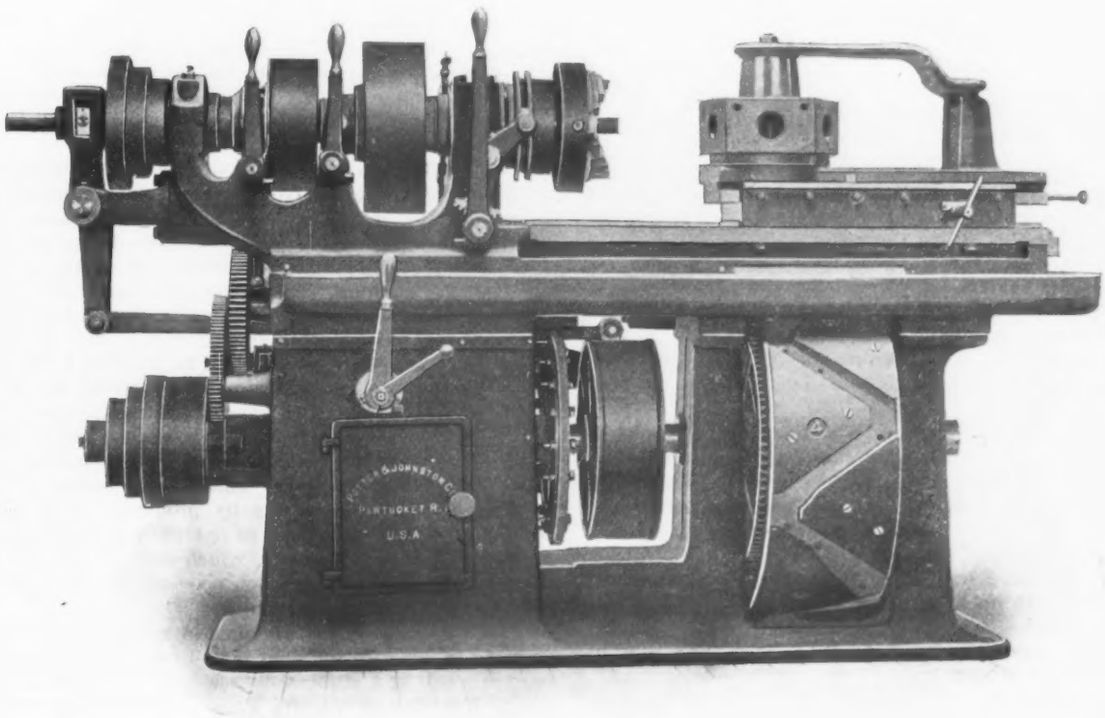
THE IRON AGE

THURSDAY, OCTOBER 23, 1902.

The Potter & Johnston Automatic Chucking Machine.

The cut here presented shows the latest improved automatic chucking machine brought out by the Potter & Johnston Machine Company of Pawtucket, R. I. It is intended for the automatic working of all kinds of castings, iron, steel or bronze, up to 10 inches diameter and 6 inches long. It possesses several new and valuable features heretofore unknown to this particular class of machinery. The turret has five sides, with 2½-inch holes, and it withdraws, revolves and advances at 40 times the feeding speed. The feed is driven and controlled by the spindle. The cross slide can be operated automatically at any time in conjunction with the turret. The turret slide is operated by a large cam drum driven by spur gearing, the power being applied near the periphery of the drum. This arrangement is very substantial and prevents any springing of the working parts. The cross slide tool blocks have a travel of 4½ inches in each direction and have screw adjustment on the cross slide. The standard set of cams furnished with the machine covers all ordinary pieces up to 6 inches in length and requires no adjustment.



THE POTTER & JOHNSTON AUTOMATIC CHUCKING MACHINE.

The automatic back facing attachment shown in the cut is a valuable addition to the machine. This attachment enables the hubs of gears, pulleys, &c., to be finished on both ends at one setting, and in this manner a large variety of pieces which would ordinarily require to be done in two holdings can be finished complete at one setting.

Another interesting feature in connection with the machine is the automatic chuck. By the use of this chuck pieces which can be handled with one hand can be placed in it and removed without stopping the spindle; thus the machine is running all the time and requires very little attention from the operator, hence he can readily run from four to eight machines, according to the class of work being done, making the labor cost of production a very small item in comparison with the increased output obtained. For gripping extra heavy or eccentrically shaped pieces a heavy scroll chuck is furnished. A pair of universal turning and facing tools is furnished as part of the standard outfit of the machine and takes care of all ordinary pieces up to 10 inches diameter.

The machine is made in three types—viz., machine with geared automatic change speed head, machine with belt driven change speed head, and machine with plain head. With geared automatic change speed head the spindle is driven by two trains of gears, each train having four changes of speed; with the belt driven automatic change speed head the spindle has four changes of speed; with the plain head machine the spindle is constant, but has four-grade cone. The machine is of liberal dimensions, has plenty of power, strength and rigidity; all working parts are simple and easy of access.

While, of course, automatic chucking machines show up their true value to better advantage when run in groups of, say, half a dozen or more, yet if a concern has not a sufficient amount of work to keep several machines going, as this machine requires so little attention it can easily be run in connection with some other machine, say an engine lathe or a turret machine, and the additional product obtained upon the automatic chucking machine is secured without extra labor cost. Although this newly designed tool has been on the market but a comparatively short time it has been favorably received by the trade, who fully realize the advantages to be gained by the use of such machines.

The United States Cast Iron Pipe & Foundry Company declared a regular quarterly dividend of 1 per cent. on the preferred stock, payable December 1.

Central Pennsylvania News.

HARRISBURG, PA., October 18, 1902.—The confident expectation of the settlement of the coal strike has brought to the industries of this city and vicinity no relief. Indeed, fuel has been scarcer than week among the local mills than at any time since the beginning of the trouble in the anthracite region. Every industry in this district has been more or less affected. The universal mill of the Central Iron & Steel Company has been closed for several days, but is expected to resume on October 20. The Chesapeake Nail Works have been closed and will not be able to begin operations for a week. At Steelton the blast furnaces have been banked several days during the week. No raw material has been received at the works, except ore in small quantities, and the output of all the departments has as a consequence been restricted. At the Harrisburg Foundry & Machine Company's plant the fuel famine has been seriously felt and the coal bins scraped. If coal does not soon arrive in quantity the works will have to be temporarily closed. The trouble seems to be more with the railroads than the mines.

Large orders were filled this week at the Harrisburg Foundry & Machine Works. Two engines were sent to New York for use in the electrical plant of the new Stock Exchange Building. A 250 horse-power engine was shipped to the Carnegie Coal Company, near Pittsburgh. Orders have been received for engines from the George A. Fuller Company of New York and from the Paxtang Electric Company of Harrisburg.

The new electrical department of the Pennsylvania Steel Company at Steelton will be operated within the next few weeks.

The Altoona Iron Company's plant at Allegheny Furnace has resumed operations after having been idle a month undergoing general repairs.

The Columbia Stove Company have been compelled to put on a night force in order to keep up with the demand for heaters.

Work has been started at the plant of the South Chester Tube Company, Chester, after a week's shut down on account of a lack of fuel. The company have now a large supply of coke on hand and no further difficulty is expected.

The brick work on the threading mill of the new pipe works at Columbia is completed. The construction of the lap and weld furnaces is now in progress. The foundation walls of the other buildings have been finished. The work has been greatly delayed by heavy rains.

The Aurora Furnace, at Wrightsville, was banked on October 15 on account of a shortage of coal. The Vesta Furnace, at Marietta, has not been affected. Both furnaces are crowded with orders and can ill afford to lose a day.

A company for the manufacture of metal cornices have been formed at Eberton, York County. Those interested are P. C. Wiest, E. A. Rice and William Wiest. The corporation will be known as the York Corrugating Company and will be capitalized at $25,000. Ground has been purchased for a plant.

Mrs. Mary Robinson and others of Brushvalley Township, Indiana County, have sold to the Lackawanna Steel Company 182 acres of choice coal and timber lands in that township for $7600.

The new puddling mill of the Duncannon Iron Company, at Duncannon, will be completed and placed in operation by December. The new mill will be equipped with ten furnaces and will employ 125 men. The old mill consists of 22 puddling and 7 heating furnaces and employs 400 men.

The Geiser Mfg. Company of Waynesboro on October 13 resumed operations with nonunion machinists, locking out all men who refused to abandon the newly formed union. The Frick Company of the same place, who some time ago posted a notice that they would not employ union men, undertook to operate without them, but later in the week rescinded the order and notified their old employees that they might return to work at their old places, the only stipulation being that union men are not to disturb nonunion men at work or discriminate against them. The Geiser Company refused to reinstate any of the locked out machinists and as a result some of them have removed. If some settlement is not made with the Geiser Company about 75 families will leave Waynesboro. S.

The Present Condition of the Manufacture of Aluminum.

Professor Joseph W. Richards, chairman of the Committee on Metallurgy of the American Aluminum Association, submitted a report at the Niagara Falls meeting from which we take the following:

The year past has seen very considerable activity in the production of this metal. This activity has not been so noticeable abroad. In Europe the industry has not progressed to anything like the degree which it has in America. As in iron and steel and copper, America has surpassed the rest of the world in the production and utilization of aluminum. This activity in America is due almost entirely to the enterprise of the operators of the Hall process. The extensions which this company have already completed or which they have in contemplation are startling.

The bauxite deposits of Georgia have been falling off in productiveness while those of Arkansas have been increasing. An exceptionally pure quality of bauxite has been found in Arkansas, but the quantity available is somewhat uncertain. If the quantity of this pure variety should turn out to be as large as is claimed by some it will furnish a decidedly superior material for this industry, better than any it has heretofore had at its command.

The purification of the bauxite has been improved. The old Bayer process has received several important improvements in its various details which have improved the quality of the alumina produced and reduced to some degree the cost of purification if not the selling price of the alumina. The Pittsburgh Reduction Company, owning themselves large tracts of bauxite lands in Arkansas, have erected this year and just put into operation a large and costly plant in East St. Louis for purifying bauxite, using the patented "lime process" devised by Mr. Hall. This process produces a quality of alumina of exceptional purity at a slightly lower cost than that of ordinary alumina by the Bayer process, and enables the users to thereby enhance the purity of the metal which they commercially produce. The same company are also preparing to operate a new electrical method of purifying bauxite, which will be operated at their Niagara works and which may still further reduce the cost of making pure alumina.

The reduction of the alumina to metal is now progressing in America on what would have been regarded ten years ago as a stupendous scale. With 11,000 horse-power operating at Niagara Falls and 5000 horse-power at Shawinigan Falls, in Quebec, America possesses 16,000 horse-power devoted to producing this metal. This will produce aluminum at the rate of 4500 tons yearly, or a production twice as large as that of the rest of the world put together. Not only is this rate of production actually in force, but the same company have in contemplation the utilization of 12,000 horse-power additional at Massena, N. Y.

This association cannot but view with gratification the success and the enterprise of this youngest of our nation's metallurgical industries. The very large scale of production, the large amount of capital invested, and the enterprise and good business sense of those producing the metal, all unite to assure to the industry a more constant and more satisfactory supply of the metal than ever before, at prices leaving a fair margin to the subsequent user and of a quality continually improving without corresponding increase in price.

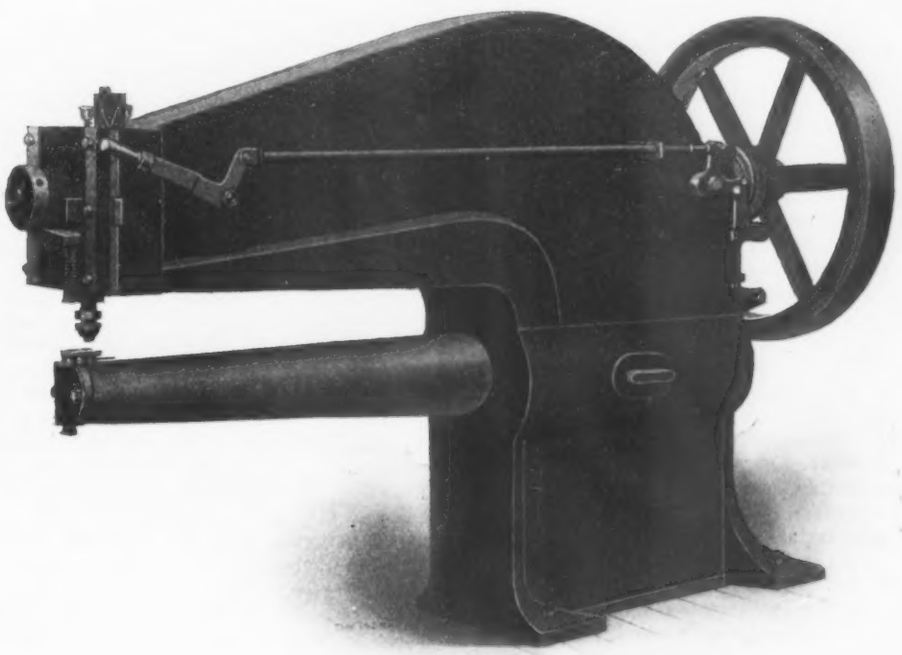
A meeting of the New York section of the Society of Chemical Industry will be held at the Chemists' Club, 108 West Fifty-fifth street, on October 24. Dr. F. Haber will speak on ferrous and ferric acids. The chairman, Virgil Coblentz, will make an address.

The Whiting Belt Power Riveter.

The belt power riveter recently designed by the Geo. Whiting Company of Chicago has a gap of 48 inches and is intended for driving ⅝-inch rivets cold, the ram running 90 strokes per minute. The rivets are inserted in the shell from the outside and a special form of hold up is used to keep the shell against the upper die as it descends. This feature is preferable to inserting the rivets from the inside, as it enables the operator to drive the rivets at least twice as rapidly. The horn or stake is made from a heavy steel forging, and has a taper bearing in the frame, being held in place by a heavy steel taper key.

One of the special features of this machine is the automatic stop and clutch. The latter is of the positive jaw type designed to have the faces lined with hardened tool steel plates, and is also provided with an adjustable cam ring which causes it to be disengaged at the end of each stroke by means of a hardened steel roller on the stop plunger, and as the clutch is not thrown in by springs, as is commonly the custom, there is no tendency for the points of the clutch jaws to strike when disengaged and thus loosen or break the jaw liners or cause the machine to make a stroke when not desired. This form of clutch and automatic stop is a very desirable feature on quick acting machines, as it permits them to work with remarkable smoothness and precision.

The upper die is so made as to be quickly adjusted for different thicknesses of stock to be riveted or different lengths of rivets, otherwise the machine requires no adjustment and there are no consequent delays. The crank shaft is made from a double hammered steel forging with the main bearings bronze bushed and of ample length to insure good wear and service. This machine can be furnished with any length of stake from 12 to 60 inches.



THE WHITING BELT POWER RIVETER.

A New Blast Furnace.—The Monongahela Iron & Steel Company of Pittsburgh, manufacturers of fine grades of muck bar and merchant sizes of bar iron, are having plans drawn for a small blast furnace. If the concern decide to build the stack it will be located alongside their present works at Hays Station, near Pittsburgh, and will be a small stack, turning out about 150 tons per day of pig iron of special quality to meet their own requirements. However, it has not been definitely decided to erect a stack. Plans for it are being drawn by George W. McClure, Son & Co., engineers and contractors, Smith Block, Pittsburgh.

The Manufacture of Ferromanganese in Russia.

At the meeting of Russian ironmasters to be held at Kharkoff in November the principal subject to be discussed is the best way in which the manufacture of spiegeleisen and ferromanganese may be developed in Russia. In a note presented to the Russian Department of Mines by Mr. Ourbanovitch it is pointed out that up to 1900 no ferromanganese was made in Russia, although that which was made in other countries was largely obtained from ores from the Caucasus, which sold at Batoum for 14 copecks per pood, while the ferromanganese imported cost 2.60 to 3 rubles per pood. Since that date the managers of the Donetz-Jouriefka Works, after expending much time and money, have succeeded in producing ferromanganese from native ores in one of their ordinary large blast furnaces. At the present time this furnace produces 1,000,000 poods of ferromanganese, selling at 2.30 rubles per pood and less. In the meantime, however, the exportation of this somewhat costly material is not practicable, and other countries continue to take from Caucasus some 16,000,000 poods of manganese ore annually. According to Mr. Ourbanovitch it would be more advantageous for Russia to replace the exportation of raw material by that of the finished product, and with this view he advocates that the import duty on foreign coal or coke used for the manufacture of ferromanganese for export should be refunded, and that a bounty of 15 copecks per pood should be paid on ferromanganese exported. Discussing these proposals, the *Moniteur des Intérêts Matériels* points out that of late years the manufacture of ferromanganese has rapidly developed in the south of Russia. In addition to the Donetz-Jouriefka Company, the Hughes, Russo-Belge and Dnieprovienne companies produce spiegeleisen, the price of which has fallen considerably. Ferromanganese with 78 to 80 per cent. of manganese now fetches 1.75 rubles per pood, and ore with 50 per cent. of manganese is now worth 20 copecks per pood at Batoum.

The Crucible Steel Company of America.

The annual meeting of the stockholders of the Crucible Steel Company of America, of Pittsburgh, was held in Jersey City, N. J., last week. Five of the directors, Reuben Miller, A. W. Mellon, Frank B. Smith, Charles E. Clapp and William H. Singer, whose terms had expired, were re-elected. The annual reports of Reuben Miller, president of the Crucible Steel Company of America, and W. P. Snyder, president of the Clairton Steel Company, a subsidiary interest of the Crucible Steel Company, were read. The report of President Reuben Miller in part was as follows:

The result of the past year shows net earnings $3,552,467.94, and there is no doubt but that this amount would have been larger had your company been able to secure prompt delivery of raw material ordered and contracted for. This, and the delays incident to severe congestion of freight traffic, for both incoming and outgoing product, has reduced the aggregate output for the year by at least 50,000 tons. The raw material deficiency will be largely corrected by the product of the Clairton Steel Company's works, and we trust the delays in transportation which still exist may in time be overcome by the railroad companies.

A complete plant for the manufacture of cold rolled steel and fine wire is in process of erection on the property adjoining your West Bergen works, and it is proposed to consolidate in that plant all the cold rolled and wire production of the subsidiary companies.

The sale of the Portsmouth and Cumberland plants was effected in order to more fully consolidate the operations of your company and decrease the cost of the management and production.

The plants of the company have been maintained in good condition and all repairs have been charged to operating expenses. The betterment, including the paid portion of the unfinished West Bergen, the cold rolled and wire drawing plant, amount to $503,766.48.

Your company are the owners of all the capital stock of the Clairton Steel Company and expect to receive from this company the manifest advantage of a supply of suitable raw material and whatever profit may be incident to its manufacture.

The Board of Directors at a meeting held October 7 resolved to charge off for depreciation and allowances $1,000,000, and carry balance of net profit for the year after payment of dividends on the preferred stock to the surplus account.

Arrangements with the holder will enable us to pay off the mortgage on your La Belle works on December 31, 1902, in amount $150,000. This, when pa'd, will reduce the outstanding mortgage or bond indebtedness on your plants of $700.

A beginning has been made for trade in foreign parts, especially in Japan, South Africa, Australia, Mexico and South America, and the encouragement given in all of these countries would indicate a market of considerable value in the near future.

The orders being received and on file justify the belief in the continuance of a demand for the maximum output of your works.

The condensed balance sheet of the company shows:

Assets.

Real estate, plant and equipment	$41,849,437.30	
Betterments	504,276.38	
		$42,353,713.68
Investment securities		1,806,022.57
Accounts and bills receivable	3,222,329.96	
Advances on account of ore and metal contracts	2,212.39	
		3,224,542.35
Cash		1,139,989.27
Inventory		6,246,459.46
Total		$54,770,727.33

Liabilities.

Capital stock, preferred	$25,000,000.00
Capital stock, common	25,000,000.00
Mortgage and bond obligations (not due)	150,700.00
Accounts payable	1,914,972.84
Park Steel Company account	68,102.60
Preferred dividend No. 8 (payable September 30, 1902)	437,500.00
Profit and loss balance August 31, 1902	2,199,451.89
Total	$54,770,727.33

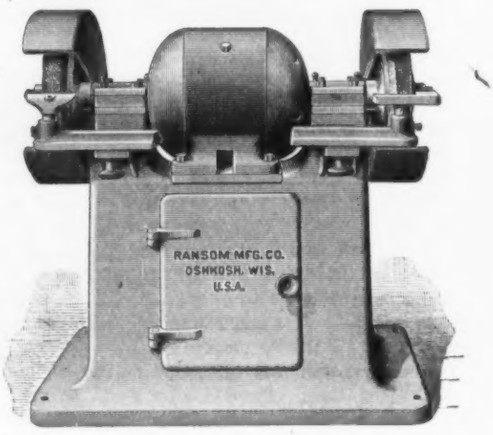
Profit and Loss Account.

Net earnings from operations	$3,503,161.69	
Dividends	49,306.23	
		$3,552,497.94
Less dividends 5, 6, 7 and 8	$1,750,000.00	
Paid to outside holdings, Park Steel Company preferred stock	16,689.75	
		1,766,689.75
		$1,785,778.19
Amount charged off		1,000,000.00
Balance to surplus		$785,778.19

President Snyder, in his report of the affairs of the Clairton Steel Company, says that six of the company's 12 50-ton open hearth furnaces at Clairton are in operation. Two more are completed and dried, and the remaining four are expected to be ready for operation by November. The new blooming mill is rolling all the steel furnished by the open hearth department. In the blast furnace department the shells of three stacks are completed. The brick work on furnaces Nos. 1 and 2 is well along, and the stoves for both furnaces are completed. Furnace No. 3 is to be in operation early next year. Arrangements on a favorable basis have been made for all the ore needed by the furnaces. The starting of the latter, however, may be delayed because of the company's inability to get ore handling machinery.

The Ransom Electrically Driven Grinder.

The Ransom Mfg. Company of Oshkosh, Wis., are introducing an electrically driven grinder carrying two



THE RANSOM ELECTRICALLY DRIVEN GRINDER.

18 x 2 inch emery wheels. The motor is attached direct to the spindle and is entirely inclosed, but means are provided for adjustment of the brushes by allowing part of the shield to be removed whenever necessary. The armature is wound on a sleeve which is keyed to the arbor. The journals are of cast iron and are provided with ring oilers. The motor and journals are well protected against emery dust. A 5 horse-power motor capable of an overload of 50 per cent. is used, which is regarded as of ample capacity to insure against injury to the motor from the heavy pressing of two men simultaneously against the emery wheels. The starting box can be placed inside the machine or in any other convenient place close at hand.

Solidity and therefore steady running is one of the principal points of this tool, the large base contributing to this feature. The journals, which are long and close to the wheels, are very rigid. The emery wheels are inclosed by permanent boxes.

Rudolph Ruben has been admitted to partnership by Robert Ganz, under the style of Robert Ganz & Ruben, agents of American manufacturers at Hamburg, Germany.

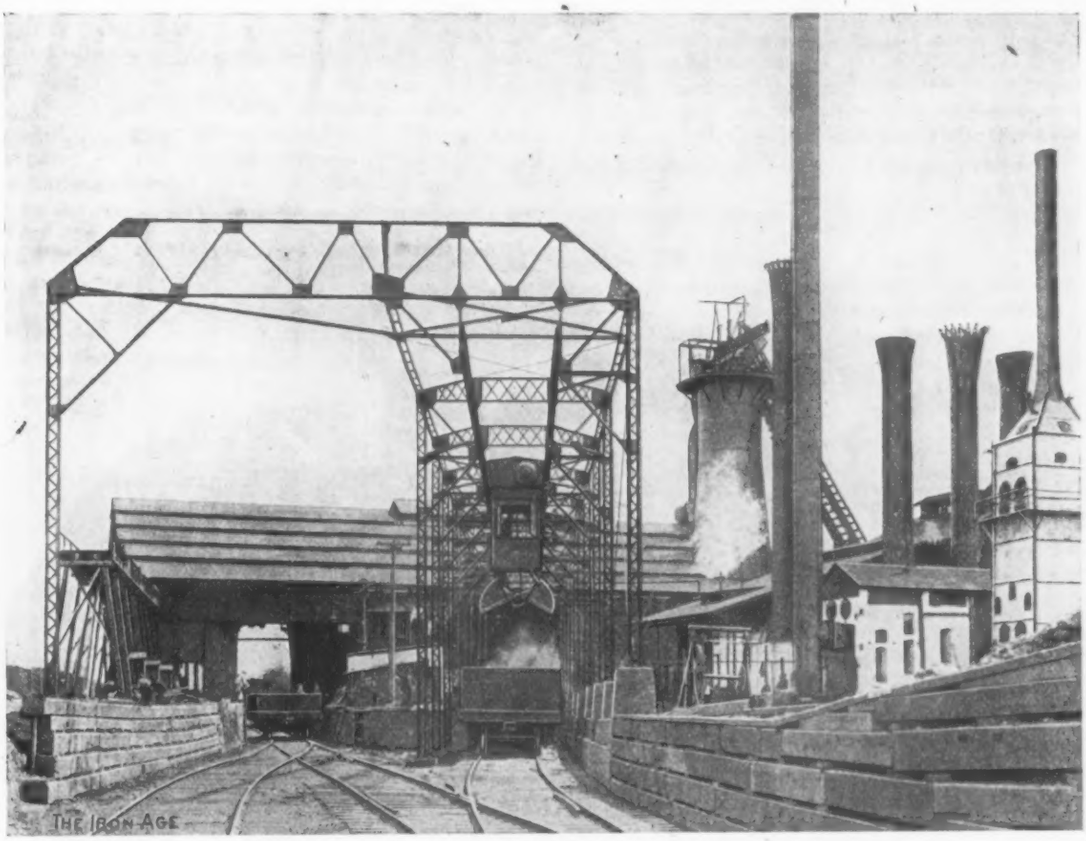
The Standard Roller Bearing Company have removed their office to their new factory, Forty-eighth street and Girard avenue, Philadelphia.

A New Plant for Handling Blast Furnace Slag.

The blast furnace operator, as well as the rest of the manufacturing world, has awakened to the fact that a saving in the cost of handling material is all clear gain, and, like the works manager in other lines, is on the lookout for new tools and machinery that will assist him to cut down the cost of production. For this reason there has been a demand for some time past for labor saving machinery of all kinds for blast furnace work, and especially for a machine to handle the furnace slag both cheaply and effectively. When it is considered that for every ton of iron taken from the furnace there is produced from 1000 to 1600 pounds of slag, and that this slag occupies from two and one-half to three times as much space as an equal weight of iron, it is easily seen that the problem is of no small importance to the economical working of the plant.

During the past three months three improved plants for handling blast furnace slag have been installed by the Browning Engineering Company of Cleveland in the works of the following companies: The Ohio Iron & Steel Company, Mary Furnace, Lowellville, Ohio; the Youngstown Steel Company, Tod Furnace, Youngstown, Ohio, and Perkins & Co., Mabel Furnace, Sharpsville, Pa. The plant consists of an overhead runway spanning the slag pit and railway track, and an electric trolley, which carries the hoisting machinery and operator's cab and handles a clam shell grab bucket. With this apparatus the molten slag is run from the furnace into a brick lined pit prepared for the purpose. As the slag enters the pit it strikes on a flat jet of water, which comes in from below, and is disintegrated by the contact and becomes of the consistency of fine gravel. It is then dug out with the clam shell and loaded into cars which stand directly beneath the runway, or it may be carried to the cement plant or other of the various works which make use of this material. Among other uses for this material may be mentioned ballast for railways, filling for roadways, bricks and artificial stone for building and paving, fertilizer, and others less important. Fig. 1 is a view of the plant at Sharpsville, Pa., showing the bucket loaded and ready for dumping into the car. This runway as built will cover six gondola cars of average length. Fig. 2 shows the bucket open ready for lowering into the pit. Fig. 3 is a side view of trolley and bucket as they appear on the runway. Fig. 4 is a general view of the machinery from above, with the cover and hoisting motor removed.

The runway proper, as will be gathered from the illustrations, is constructed entirely of structural shapes, and is thoroughly braced to withstand all stresses due to dead and live loads and wind pressure. It is built either with or without a corrugated iron covering, the trolley in the latter case being completely inclosed in a weather proof housing. The length of the runway varies from 120 to 300 feet, according to the room available, the number of cars to be loaded and the size of furnace.



Bucket Dumping Into Car.

A NEW PLANT FOR HANDLING BLAST FURNACE SLAG.

The trolley is constructed with a structural steel frame supported on four track wheels. All bearings and the hoisting and traveling mechanism are placed on the top of this frame, which allows ample and convenient room for inspection. The hoisting and lowering are done with one motor, and the traveling along the track with a separate one. An electric brake in series with the hoisting motor automatically clamps the motor shaft whenever the current is cut off, either purposely or accidentally. The operator rides with the trolley in a cab which protects him and his controllers from the weather. The cab is built of steel and has glazed windows, which may be used in the winter and removed in the summer if desired.

The clam shell bucket was built especially for this work and is of very heavy and rigid construction. It is operated by a single line of wire rope for closing and hoisting, and by two lines, one on either side, for lowering and opening. This arrangement prevents the bucket

from twisting around and wrapping the ropes about one another. The jaws of the bucket are well filled with small holes which drain out the surplus water. The capacity is 2 cubic yards on the level.

One feature of this machine which is worthy of particular attention is the simplicity of its operation. That is, all the movements of the bucket are accomplished by means of a single lever, one operator only being required, and no foot brakes or clutches being necessary. A bucket of this type requires two sets of drums for its operation. One set must remain stationary and hold the bucket in position while the other opens or closes the bucket, and then both must act together to hoist or lower the bucket, as the case may be. That is, the bucket is held and opened, discharging its contents, then lowered while open, then closed, digging into the granulated cinder and filling itself as it closes, then hoisted ready to be opened and dumped. The automatic operation of these movements is accomplished by a patented starting device, which, when the controller lever is thrown to the lowering side, allows the bucket to open and one drum to unwind to the point where the bucket is fully open. It then starts the other two drums down at the same speed as the first, thus lowering the bucket with its maximum opening until it rests on the material to be loaded. The next operation is to reverse the controller, which causes the hoisting drum to wind up its rope and close the bucket, at the same time digging into the pile and loading the bucket. Then, at the point where the bucket is tightly closed, the same device starts the side drums, and the whole is hoisted to a position for dumping. In this position the loaded bucket is carried along the runway to the car, bin, dump or other place of disposal.

Another feature worthy of mention is the combination of mechanical brakes with the drum shafts, in addition to the electric brake, which makes it impossible to lower the bucket except by means of the motor, and thus absolutely does away with any danger of dropping the bucket or load through failing current or careless handling.

The pit is usually built large enough to hold about two days' run of cinder, to cover cases of emergency. For a five-car train the trolley will average 1½ minutes per trip, or 40 trips per hour, and will load a train of this size made up of the regular run of gondola cars in 3½ hours actual running time, or at the rate of 1½ cars per hour. The bucket load will average between 1½ and 2 tons in weight.

Thus, with this machine one man, working 4 to 8 hours per day, can do the work of 10 to 20 men working in a cinder yard in two shifts, where the handling is done entirely by hand. At the smaller furnaces even the saving thus effected will pay for the installation in one and a half or two years, and at the larger ones in much less time.

Some of the advantages claimed for this machine are that it occupies only the yard room required for one

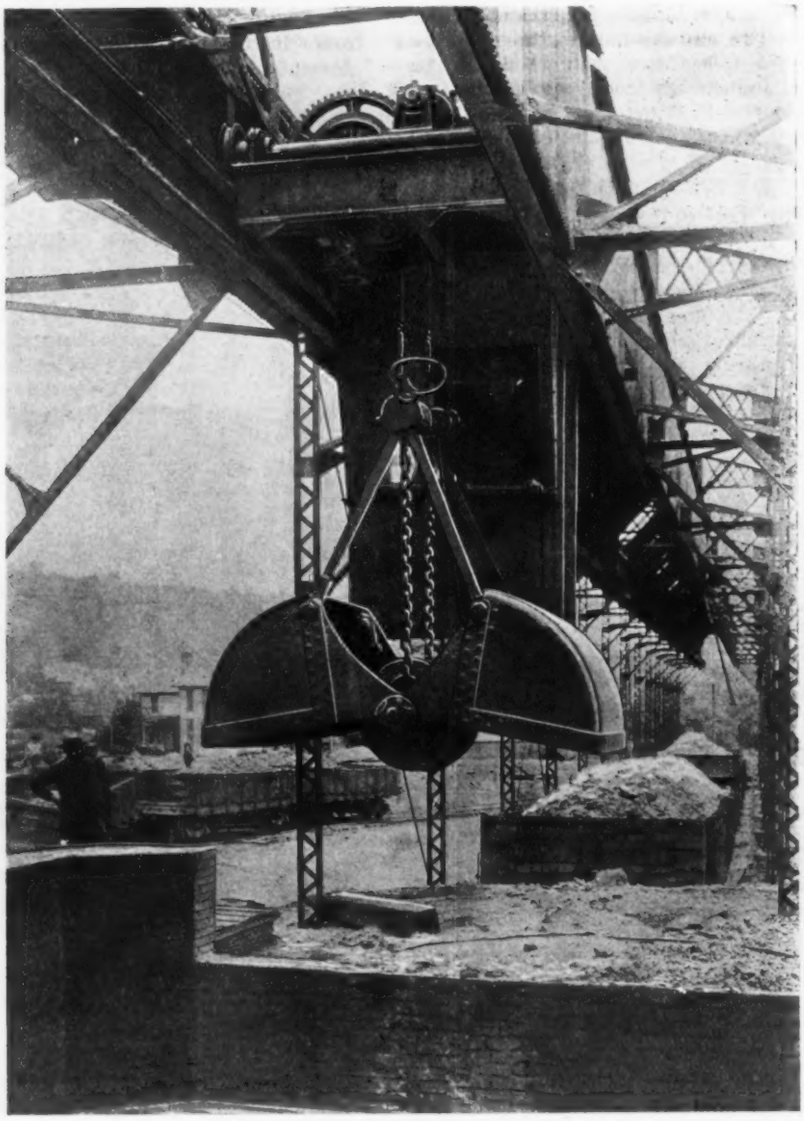


Fig. 2.—Open Bucket Ready to Be Lowered Into Pit.

A NEW PLANT FOR HANDLING BLAST FURNACE SLAG.

track, and is up in the air out of the way of other work in the yard. The runway may be built to cover enough cars to hold the slag for 24 hours' run or more, so that a switch engine is required but once a day to bring in the empties. The pit and loading track in many cases may be located so that the runway may be extended into and through the cast house, where it can be hung from the roof trusses. The bucket may then be used for unloading sand from the cars and carrying it into the cast house and for carrying out scrap, flue dust, &c., and loading into cars or depositing elsewhere as may be required. Being electrically operated and so simply controlled the machine does not require an engineer or skilled mechanic to run it, any man of ordinary intelligence doing the work satisfactorily after one day's practice. No fireman or other assistant is needed and one man can easily handle all the slag which the furnace makes. By the use of a suitable bucket this machine may also be adapted to handling sand, cement, fertilizer, coal, ore, limestone, and other substances in bulk and of a granular character.

The Technolexicon.

The National Society of German Engineers are engaged in the work of publishing a technical dictionary under the title "Technolexicon," and ask the cooperation of other technical and industrial societies, domestic and abroad. Being aware of the great difficulty of such a task, and in order not to make the work too voluminous, the Society of German Engineers decided to publish the dictionary in the three languages, English, French and German.

Belgium, France, England and the United States, the collection will probably not be completed before the end of the year 1904, when the compilation of the contributions will begin, which will occupy about two years more, so that the manuscript will be ready by about

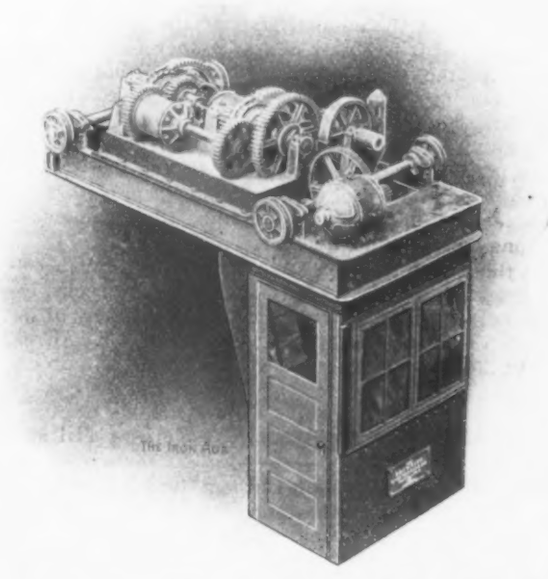


Fig. 4.—General View of Machinery with Cover Removed.

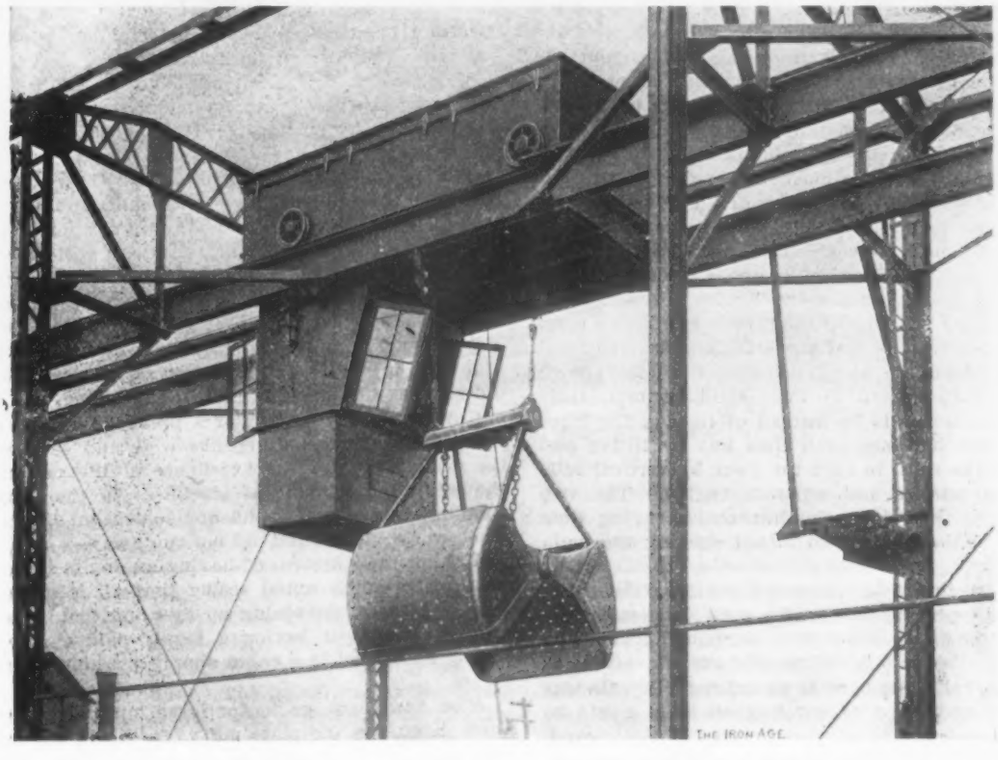


Fig. 3.—Side View of Trolley and Bucket as They Appear on the Runway.

A NEW PLANT FOR HANDLING BLAST FURNACE SLAG.

Dr. Hubert Jansen, whose name has already become connected with other encyclopedic works, was elected editor in charge of this great new undertaking, and at the forty-third general meeting of the Society of German Engineers in Düsseldorf, Germany, reported progress.

An idea of the comprehensiveness of the work can be concluded from the statement of Dr. Jansen that, though words have already been gathered for one and a half years by societies and individuals in Germany, the end of the year 1906, after which it will go to the press.

According to Dr. Jansen, not only contributions of technical terms with the translation for them are valued, but also such contributions as, in giving merely the technical term, give at the same time an explanation thereof—viz., in which sense or in which connection the term is used—and also contributions regarding customary phrases, as used in the technical lan-

guage of the country, are highly appreciated. If very uncommon terms are communicated it is desirable to give at the same time the source where the term may be found.

The principal sources for the Technolexicon are, of course, these contributions, but of great value are also catalogues, price-lists and other printed matter of industrial firms, from which catalogues, &c., the technical terms can be gathered by the assistant editors and other collaborators of the editoral staff of the Technolexicon in Berlin, and it is highly desirable, therefore, in order to further the work of this dictionary, that all the manufacturing firms publishing printed catalogues, price-lists, &c., send a copy of their printed matter to the "Editor of the Technolexicon, Dr. Hubert Jansen, Berlin, N. W. (7), Dorotheenstrasse 49," as the Technolexicon, once completed, will undoubtedly prove a most valuable help in the work of translating catalogues from one language into another.

All those who may desire to contribute through collecting terms and phrases may apply for note books, especially arranged for that purpose, and for letters of information directly to Dr. Jansen or to Dr. Alfred Mueller, 150 Nassau street, New York City.

An Englishman on American Rolling Mills.

Henry Crowe of the South Durham Steel & Iron Company, West Hartlepool, has recently published an account of a visit to this country. So far as it is descriptive it possesses little interest to American readers. Some general remarks on points of difference are worthy of consideration. Mr. Crowe says:

With regard to the mill engines, the reversing engines are very fine indeed and of ample power. If the Americans are behindhand at all it is that they have not yet adopted the three-cylinder engine instead of the two-cylinder ones. There can be no doubt about the economy—capable of being started easily in any position of the cranks, worked expansively, with its even turning moments, meaning that a less engine will do the same work and less liability to break rolls. Condensers are being rapidly fitted to most mill engines—Carnegies favor the Weiss type. The screws of the housings were always worked by electricity or hydraulic power.

Perhaps the most noticeable difference from the English practice was the speed of the rolls, reduction gearing generally being conspicuous by its absence. Generally speaking I should say the speeds are double ours. Having high pressures and powerful engines they put a heavy draft on the piece, bringing it rapidly down while hot. With regard to their slabbing mill, their latest practice seems to be instead of turning the ingot to edge it, which means both time lost by tilting and screwing up the rolls, to edge the piece by vertical rolls driven by a smaller and separate engine. The two operations are thus done simultaneously, saving time in addition to the time saved in not opening the main rolls.

With regard to the fly wheel mill engines, these were all very fine types, all fitted with some economical appliance of some kind. Many were compound condensing fitted with Corliss or other automatic cut off valves. A common slide valve engine with an ordinary throttle was hard to find, and many of our English mills would be more economical if they purchased some of the second-hand engines which the Americans offer for sale, although I do not approve of this policy.

Horizontal furnaces with power worked doors for reheating slabs were the rule.

Gas Fired Heating Furnaces.

Gas fired regenerative heating on the Siemens principle was universal. It might be said that the abundant supply of natural gas prohibited the adoption of the ordinary direct coal fired furnace, but at the various works which were without the natural gas, gas regenerative furnaces are always adopted. Their advantages over the coal fired furnaces are very numerous. I do not believe that the outputs of the American mills would be so great, or their mills run so smoothly if it were not for the regenerative furnace. The unequal heating of ingots in a coal fired furnace is liable to cause the piece to come out anything but straight from the rolls.

With a reversing engine the mill can be stopped or eased down, but with a continuous running three-high rail mill I do not believe that such huge outputs could be accomplished with steel heated in coal fired furnaces. Their other advantages are, no stoppage for cleaning grates, less labor, cleaner work, less coal consumption (even after deducting any allowance for steam raised from waste heat), less repairs and—not least—less waste of steel, and I think I might rightly add, less steam to roll the piece down.

Rapid Building.

Although their plants are very expensive, there is no useless expenditure. Everything seems just right for the work it has to perform, neither too strong nor too weak. Every item, from the largest to the smallest, we could see had been carefully considered and worked out. The astonishing rapidity with which they build a whole works is remarkable. After the designs are completed they work on the foundation day and night. During this period every particle of machinery required is ordered, and the steel structural work for the sheds is got on the way and column foundations put in. The overhead cranes they will erect first, and use them as soon as possible for the erection of the various machinery; thus in a year they erect a works, which they say "operates" before it wants "tearing down" for something more modern. What the Americans consider worth doing they do well. There is no makeshift principle.

The American mills are all about 3 feet higher up than our mills; thus the slabs or blooms have not to fall 2 or 3 feet from the furnace to the rolls. Another advantage is that all the roller gear is not underground, or the mill engine so low down. Machinery is thus more easily kept clean and in good repair. All mill spindles are carefully balanced, resulting in smoother running and less wear and tear on the roll wobblers.

Electric generators giving 250 volts continuous current were the rule, with an inclination to fairly large units, driven by open vertical high class engines in duplicate sets.

Perhaps it is hardly fair to tell you that while watching one of the Homestead reverse mills running a piece broke off the emergency valve and stuck in the regulating valve so that the engine ran away with 150 pounds of steam behind it. The engine and mill raced backward and forward at an alarming speed until the steam was shut down on the mains. We very politely left the mill. The very next day we were asked if we would like to see that mill operating that got away a bit yesterday. We did see the mill working and in full swing, not a tooth out of any of the pinions or a breakage of any sort. I think this fact not only speaks well, and very well, for the design, but for the excellence of the material and the minimum amount of slackness in the boxes and spindles, and also for the enginemen in charge; they stuck to the engine and did not run away.

I think their system of having an engineer in charge continually going round seeing that all is right, oiling here and there, tightening up this and that, is a better plan than ours of having a highly paid engine driver sitting on a stool in a cabin simply working a couple of levers.

The Americans go in for large outputs to get their costs down. In the plate mills they do in one stand of rolls what we do in two. In our plate mills when rolling in the soft rolls the hard rolls are going round doing nothing; when finishing in the hard the soft are doing nothing. This they could not stand, and would not be long in putting down another engine, and so greatly increasing the output without proportionately increasing the toal cost. All the important plate mills were equipped with cold straightening machines. The mill seems to me to be the proper place for straightening plates instead of the bridge or ship yard.

The American works are newer than ours. When they put theirs down they no doubt copied all the good things we had, and at the same time introduced as many improvements as possible. It is now time we did the same thing.

I have not touched on the difference of the British and American workman; this would be a paper in itself. I might say, however, they all seemed to have their heart in their work. If any new machinery or process is about to be tried they all do their best to make it a success. The managers would not be troubled with several union officials on their tracks to know what benefit the men will get out of it before the job is started.

That in America standardizing as much as possible is of the greatest value to them there is no doubt, as it leads to cheap production and quick delivery. When all our Great George street engineers, together with manufacturers, agree on standard specifications for steel, on standard designs for bridges, &c., as far as possible, so much the better for England. What contractor is not frightened at the words in a specification, "The Consulting Engineer," and often the most difficult part of a manufacturer's estimate is to know what to put on for that gentleman's power, but this again is outside the scope of this paper.

The Columbus Iron Works.—The Columbus Iron Works, Columbus, Ga., have completed the rebuilding of their plant, which was destroyed by fire last April, and have the Southern plow department in full operation. The new works occupy two entire squares and are much larger and more modernly arranged than the old, special attention having been given to their construction for the quick and economic handling of goods. The river, only a block away, and eight sections of railroad tracks in and about the premises furnish excellent shipping facilities. The plant proper, the manufactures of which include steam engines, saw mills, mill and gin gearing, boilers, pumps, absorption ice machines, &c., consists of machine shops, 112 x 300 feet, two stories; boiler shop, 60 x 150 feet; blacksmith shop, 40 x 60 feet; wood working shop, 60 x 160 feet, and foundry, 112 x 240 feet, equipped with two large cupolas and a 25-ton electric crane. In addition there are the plow works, 180 x 300 feet, composed of two and three story buildings, and an agricultural and wood working department, 75 x 100 feet. The plant will be operated by independent motors, the power being furnished by a battery of four large boilers and a 400 horse-power Corliss engine driving two direct current generators of 150 kw. each. The officers are G. W. Brown, president; A. J. Teague, vice-president, and G. B. Whiteside, secretary and treasurer.

The Rio Grande River Bridge, Costa Rica.

The people of the United States are particularly interested at this time in their near neighbor, the republic of Costa Rica, on account of the building of the interoceanic canal. The population of Costa Rica is composed, in the main, of small farmers, who own their lands, and who, in consequence, form a contented and peaceful nation. The soil is particularly rich and productive. The principal products are coffee, bananas, cocoa, rubber and lumber. The country is far from being opened up, owing largely to the present poor conditions for transporting merchandise.

The only means of transportation at present between the Pacific Coast and the interior is the slow going ox cart at a cost of $1.60 per hundredweight, and the fact that hundreds of these primitive conveyances can be seen daily on the national highway is more than sufficient to demonstrate to even a casual observer the great advantages that will accrue to the country and its commerce by the completion of the Interoceanic Railway, as nearly all the principal towns and villages and all the mining camps and centers, with fully two-thirds of the population of the entire country, are situated on the Pacific slope. It can readily be seen that a road of this character should be an assured success from the start.

THE RIO GRANDE RIVER BRIDGE, COSTA RICA.

In connection with this matter it might be of interest to state that the present tariff of the Alantic Railway from Port Limon to San José is as follows: $19.78, gold, per ton, first class; $17.90 second class; $12.43 third class, for a haul of about 100 miles. The passenger tariff is 4 cents per mile. The Pacific Railway of Costa Rica is a road which is needed, and which when completed will be 60 miles long, and extend from San José, the capital of the Republic, which is connected by rail with the Atlantic Coast, to the Pacific Coast. This connecting line will give easy and quick communication between the Atlantic and Pacific coasts. The gauge of the road is 3 feet 6 inches, with a maximum grade of not to exceed 2½ per cent. through the mountain district. The total cost of the road, when completed and equipped, will be $3,000,000, gold. The Government has paid up to April 1, 1902, $1,126,925.75 gold in cash, and has issued a corresponding amount in bonds.

With the exception of a few small streams, the great obstacle to be overcome was the crossing of the Rio Grande River. At the particular point where this crossing was made a bridge was required approximately 800

feet long, with the rails not less than 340 feet above the water. Some idea of this great hight can be appreciated when it is stated that it is almost twice as deep as the Niagara gorge. The sides of this cañon are almost vertical. The road is now completed and in operation from San José to a point 20 miles beyond the Rio Grande River crossing, a total distance of about 46 miles. The grading and masonry are also finished for some distance beyond this point, which includes all the heavy and mountainous work.

The Rio Grande River bridge, which is particularly the subject of this article, is probably the largest and finest bridge in Central America. Realizing the many difficult engineering problems connected with a cantilever arch bridge, the railroad company placed the order for the whole construction of the steel work with Milliken Brothers of 11 Broadway, New York City, who are so largely interested in exporting work pertaining to structural steel work for bridges and buildings. The entire work was executed by them. In order to avail themselves of the best engineering advice Milliken Brothers called in consultation Theodore Cooper, the well-known consulting engineer, of 35 Broadway, who, in conjunction with Gunvald Aus, civil engineer, made all of the actual calculations.

It was decided to adopt a design calling for a riveted deck single track bridge, consisting of a braced arch of 18 panels, each 24 feet 10 inches long, or 448 feet 8¼ inches center to center of pins, and two cantilevers, each of two panels 23 feet 7½ inches long, making a total length between end pins of 684 feet 11¼ inches. The accompanying illustrations, Figs. 1, 2 and 3, convey an excellent idea of the bridge and the cañon which it spans. The character of the anchorage, trusses, the floor system bracing, &c., are shown on the diagrams, Figs. 5, 6 and 7.

The bridge is designed under Cooper's specification for a live load of 2800 pounds per lineal foot of span and a dead load of 3000 pounds per foot. The top lateral system is proportioned to resist a stationary wind load of 150 pounds per foot of bridge. The moving wind load is supposed to be transmitted through the sway bracing into the bottom lateral system, so that this latter is proportioned for a stationary wind load of 150 pounds per lineal foot of bridge and a moving wind load of 300 pounds per foot. The three panels at the end were formed into supported spans to prevent the possibility of any hammering at the abutments. The braced arch was originally figured in strict accordance with the method given in Professor Greene's book on arches. The method is exceedingly tedious for such a great number of panels, and as the bridge had to be refigured on account of a change in the length between end piers a modified method was used, which, in the meantime, had been developed by Mr. Cooper. The temperature stresses were calculated for a total variation of temperature of only 70 degrees, as the bridge is built in a country where no great variations occur.

There were two or three changes in the ordinary design and character of bridges of this kind. In the first place, the shoes carrying the main span are constructed entirely of rolled steel, so that no cast steel or cast iron was used in the construction of this bridge. The main pins were 15 inches in diameter. Fig. 4 shows two of these shoes in Milliken Brothers' shops in South Brooklyn just before shipment. An idea of their size is clearly given by this engraving. The boring and turning of the pins were finished complete at Milliken Brothers' works. Another innovation was the setting of these shoes in the same plane with the main trusses, instead of in a vertical plane as is usually done; in other words, the foundations were set at an angle, and the shoes

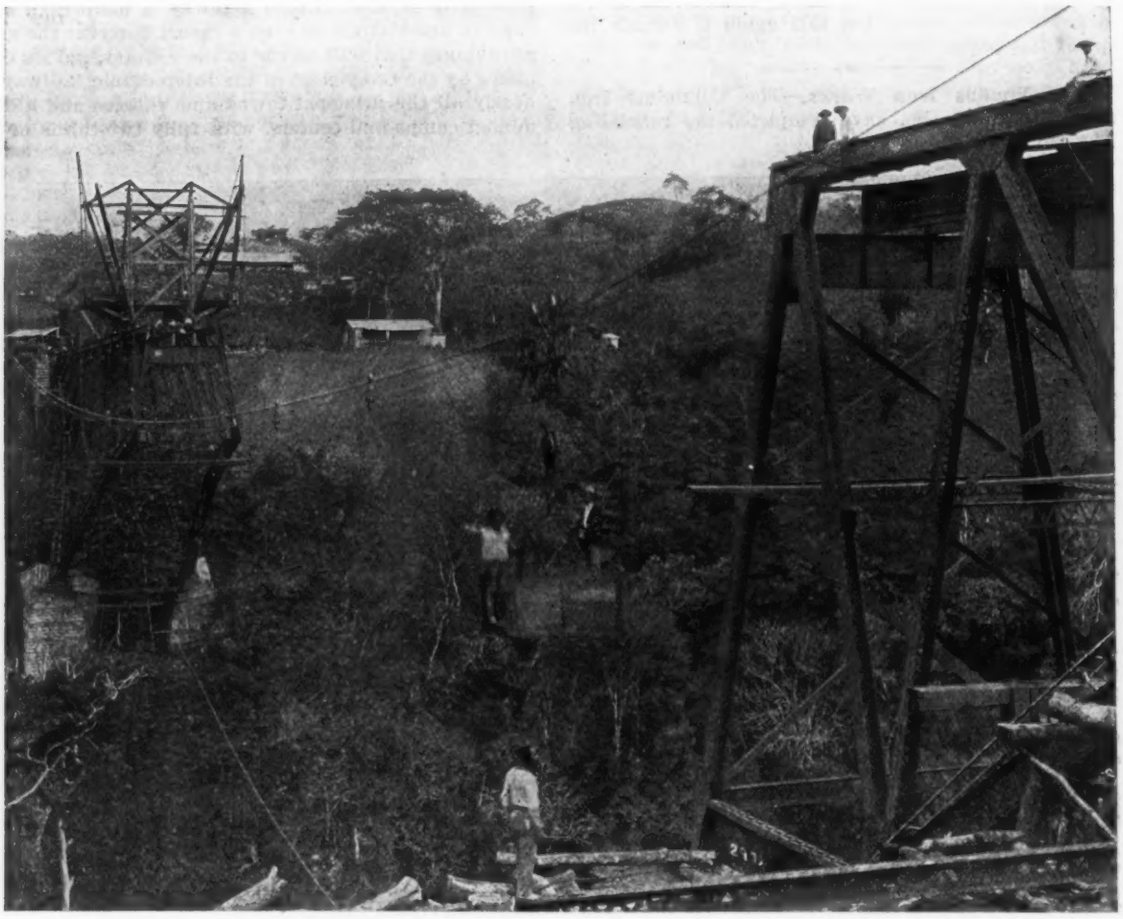


Fig. 2.—Cableway Used for Transporting Material Across the Cañon.

THE RIO GRANDE RIVER BRIDGE, COSTA RICA.

were in a plane with the trusses, so that the pins were at right angles to the axis of the truss and the axis of the shoes. The shop work on this structure reflects the greatest credit on the management of the works. Although the entire work was turned out by them in about one month, not a single error was found, and, to use the erector's expression, "The bridge went together like clock work."

Particular care and attention was given to the laying out of the base lines at the bridge site and locating the exact points for setting the shoes. Two steel tapes were purchased in the United States and sent to Washington and standarized by the United States Government. They were corrected for every 10 degrees of variation in temperature, and were furnished with spring tension arrangements, so that under a given load the tape gave exact measurements. One of these tapes was sent to Costa Rica to be used as the standard in laying out the work, while the other tape was retained in the United States and was used in the shops as a standard.

The work of erection in the field was carried on under great difficulty. All of the work for half of the bridge had to be transported across by cableway, as shown in Fig. 2. The crudest kind of false work was used to save the expense of sending down so much lumber for the erection of the shore spans. Some idea of the character of this rough work can be seen in examining Fig. 3.

The abutments were built of concrete, with anchorage consisting of eye beam grillage, placed at the base of the abutment and 8 feet 3⅛ inches below the top of the upset rods straddling the end floor beams and connecting with the eye beam grillage, as shown in Fig. 5.

The uplift on the shore arms amounted to about 280,000 pounds per truss, and the abutment and rods were designed to resist this load, but in order not to have too much pressure, and consequently great frictional resistance, on the screw threads of the anchor bolts when lowering the arms in position after they met at center, a considerable load was superimposed on the shore arms, so that no such strain ever came on the anchorage.

In order to allow a certain amount of leeway, to make up for any possible small errors in the placing of the shoes, the center sections were made somewhat shorter than the calculated length, the holes in one side of the center gussets and splice plates left blank, to be drilled in the field after all parts had come to a full bearing, and a number of planed shimming plates were shipped along to be used as needed.

As a further safeguard, the center chord sections were held at the shop until the arms came sufficiently close together to allow of exact measurements, and thus correct any errors in the shop before shipment. It was, however, found that no corrections of any kind were necessary, and the works were telegraphed to ship the center sections exactly as turned, showing the great accuracy obtained in the shop and in the field relative to this work.

During erection the shore arms were bolted up solid to form a continuous arm so that the center arch could be erected from each abutment with only a vertical anchorage, the top chord being designed to carry the entire tension from erection loads. After erection the

Fig. 3.—Rough Work Used in Erecting Shore Spans.

THE RIO GRANDE RIVER BRIDGE, COSTA RICA.

splice plates were removed from the bottom chord panel at the end of the supported spans. The top panels were left solidly riveted up, as it is not thought serious to allow a slight bending in the comparatively shallow chord under partial loading, and a much more rigid structure is obtained by not interrupting the top lateral system at this point.

The Pacific Railway of Costa Rica are very proud of the successful completion without a hitch of this important piece of engineering work, and are now regularly using the bridge to carry their traffic.

Notes from Mexico.

Credits in Mexico.

DURANGO, October 11, 1902.—In an address read by V. W. Foster at the banquet of the Credit Men's Association in Chicago recently, an exhaustive as well as interesting review was given of Mexico's progress during the past few years, and of the country's present financial and commercial condition. Señor Joaquin D. Casasus of the City of Mexico supplied convincing statistical data in relation to the public revenues and kindred subjects. The paper has been republished in the English press of Mexico. No apology is needed for quoting the following from the closing notes of Señor Casasus' valuable trade review: "It is the invariable custom of the merchants of Mexico, and one that has been followed by all banks, to grant credits on current accounts, or on six months' notes. The difference between the system followed in Mexico and those of Europe or the United States consists in the long credit given to traders, and this credit finds its support in the customs of the commercial classes, who sell to their customers with that credit. If the merchants in selling their goods grant that credit to their customers it becomes absolutely necessary for the banks to place themselves in such a situation that they can also lend to the merchants on six months' time." To prove that this system of long credits is a help rather than a hindrance to business and a factor which lends stability to commercial transactions, Señor Casasus says: "I need only inform you that no bank has ever failed, and that the failures among the commercial classes of the Republic never exceeded ten in the last years. The traders of Mexico have distinguished themselves for their unquestionable rectitude, which is based on their prudence as well as the good judgment and discretion with which they carry out their transactions. The wild speculations that in the United States are produced by what is called 'inflation,' or business 'booms,' are entirely unknown in Mexico."

Railway Matters.

Much interest has been created in railway and business circles here by the action of the Mexican Government, which by a recent purchase of the company's bonds in London has become the virtual owner of the Interoceanic Railway, which runs from the City of Mexico to the Gulf seaport of Vera Cruz. The motive underlying the Government's action is believed to be a desire to prevent possible inconveniences which might arise in the event of railway consolidations. The Government's move is favorably commented upon, as the maintenance of an independent line to the Gulf will impede any step which might be calculated to injuriously affect the business interests.

The idea of a union of all the Americas by a concrete bond in the form of steel rails stretching from the far north to the tropical pampas may at least now be said to have taken shape so far as regards the initial step in its reduction to a practical basis. The first section of the Pan-American Railway, 50 km. in extent, has been completed. This piece of road unites the Pacific port of Arista and the town of Aurora. It was "inaugurated" with enthusiasm a week or so ago.

Mexico's railway mileage now exceeds that of any

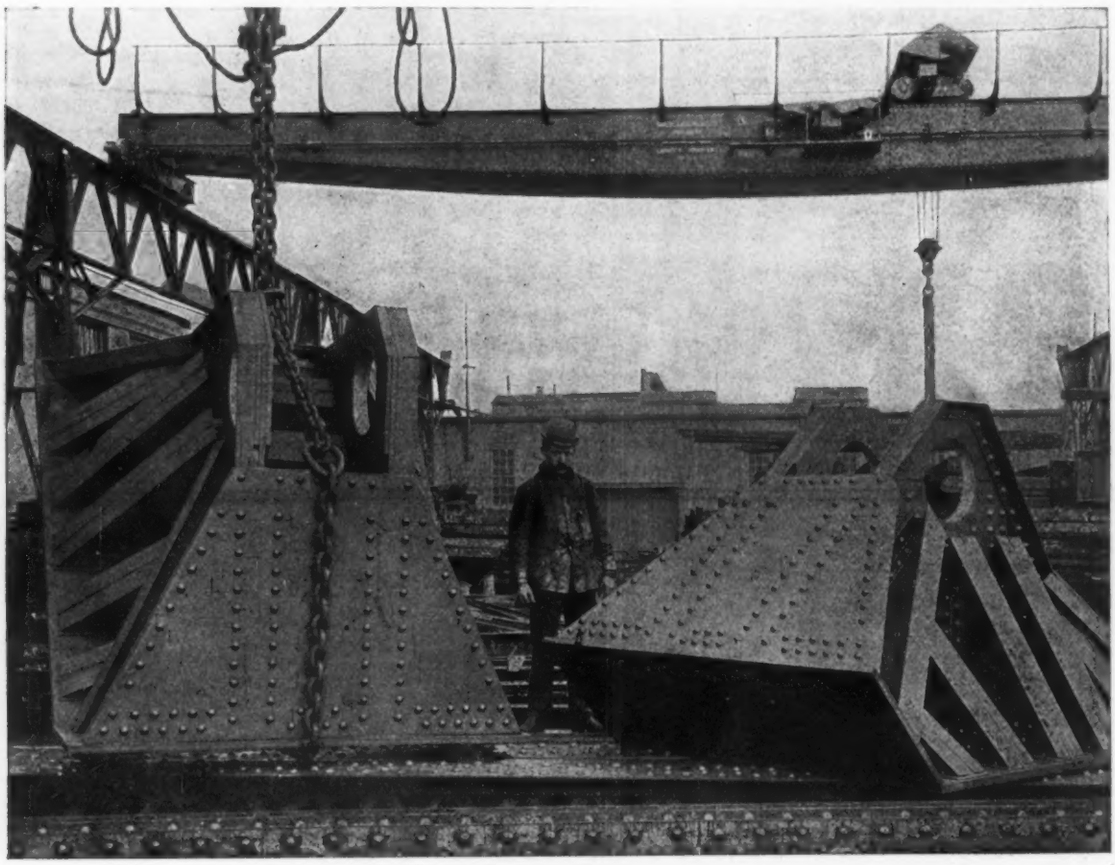


Fig. 4.—Two of the Shoes to Carry the Main Span.

THE RIO GRANDE RIVER BRIDGE, COSTA RICA.

other Spanish-American country, the total being nearly 11,000 miles. This has nearly all been constructed during President Diaz's administration of the country's affairs. The Government's plans for future railway building are epitomized in an official way as follows:

"The union of the center of the country with the Pacific Coast by continuing existing roads to Guaymas or Topolobampo, another to Mazatlan, a third to Manzanillo, and a fourth to Acapulco or Zihuatanejo; so that our communications with the Pacific may leave nothing wanting.

"The continuation of existing roads southward, connecting with the Tehuantepec National Railway, and thence the extension onward toward Guatemala; a line which some day has to become continental, uniting our northern with our southern frontier, traversing our national territory in its whole length and breadth.

"And, finally, the establishment of more direct communication between Mexico and Tampico, which, if not indispensable in view of the actual lines of communications with that port, would serve to unite by the shortest possible road the port of Acapulco with the capital of the Republic and the northern frontier."

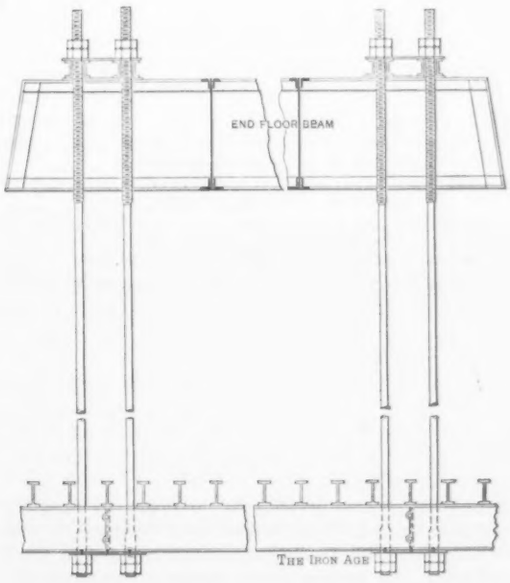


Fig. 5.—Detail of Anchorage.

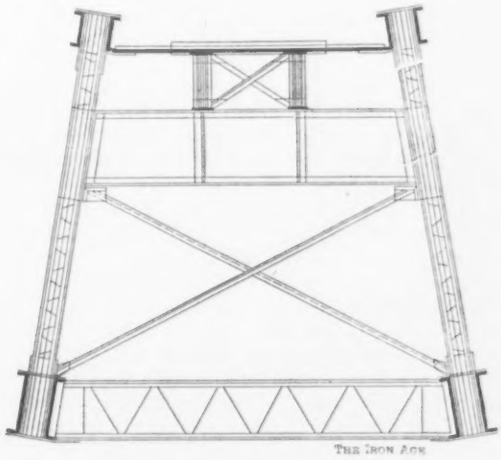


Fig. 6.—Typical Cross Section, Showing Bracing.

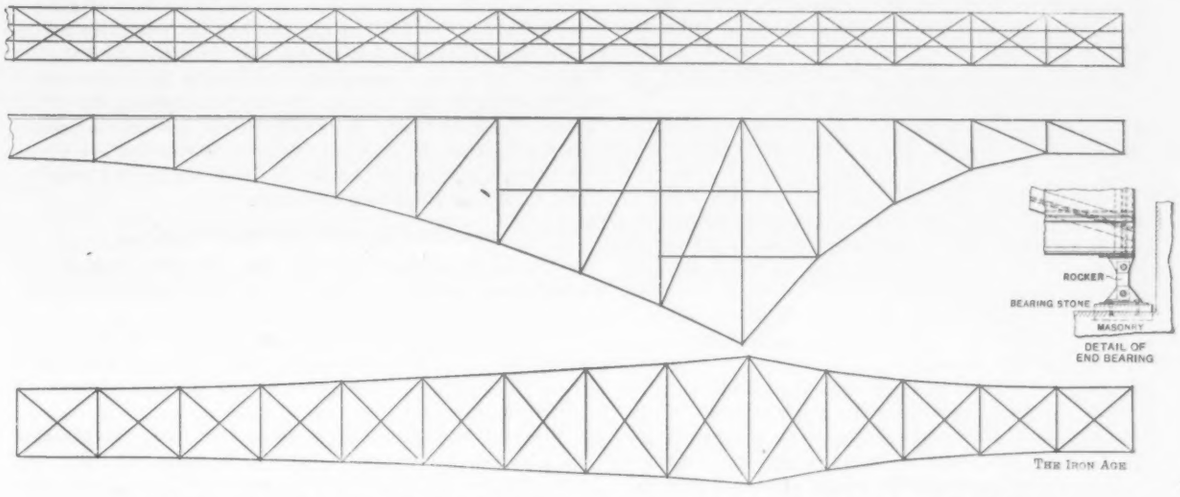


Fig. 7.—Plan of Top Chord, Side Elevation, Plan of Bottom Chord and Detail of End Bearing.

THE RIO GRANDE RIVER BRIDGE, COSTA RICA.

Industrial Notes.

Notwithstanding high exchange rates Mexican railways seem to be freely placing orders for rolling stock. The Mexican Central Railway Company have recently ordered a number of new passenger coaches from Harlan & Hollingworth, and 75 freight cars from the American Car & Foundry Company.

Mexican investors appear to think well of the prospects of the Monterey Iron & Steel Company. The $100 shares of the company are always in demand at a premium of $6 or $7 above their paid up price.

J. J. D.

The Lebanon Strike.—The American Iron & Steel Mfg. Company and their striking puddlers and finishers met Saturday afternoon, October 18, and effected a compromise and the strike was declared off. The puddlers are to receive an advance of 25 cents per ton. The finishers are not granted an increase, but are not to be subjected to any reduction if the puddling rate drops from $4.50 to $4.25. The colored strike breakers in the company's shops at Reading are to be discharged and all strikers are to be reinstated. The strike began May 5.

At Pittsburgh, in the case of James McNeil, Brother & Co., against the Crucible Steel Company of America, a verdict was rendered last week for $46,746.94 in favor of the plaintiffs. The action resulted from a boiler explosion at Park mill, owned by the defendants, on December 28, 1901. The plant of the plaintiffs adjoined that of the defendants, and it was alleged the former was damaged to the extent of $75,000. It was charged that the boilers in the defendants' plant were defective. The verdict includes $10,000 for loss of business and $2227.30 interest.

The Suppression of Smoke in Steam Plants Using Bituminous Coal.*—IV.

BY ALBERT A. CARY, NEW YORK.

Thickness of Fire Bed and Length of Grate.

It is practically impossible to make any definite statement regarding the best depth of fire bed to be carried, although a general consideration of matters bearing on this subject is interesting.

The kind of coal used and the working draft pressure are the two principal controlling features governing in this matter. The depth of any one fire bed, when bituminous coal is used, is generally a variable quantity according to the condition of the fire—that is, whether it is clean or dirty. Some bituminous coals when thrown on a hot fire bed fuse quickly and swell up so that in certain cases a fire bed of 6 inches will swell to one 12 inches in depth, but what is referred to here is the depth carried during average working conditions, when the crust has been broken up and a moderately clean fire exists.

There are, unfortunately, numerous cases where we are unable to regulate the depth of our fire bed, owing to a too limited area of grate surface, sometimes put in without regard to the fuel conditions to be met, and sometimes owing to a most foolish economy of room by an architect or owner of a building, causing the boiler to be crowded into some out of the way cramped space, and thus forcing the use of narrow furnaces and either abnormally long grates or else those of too limited area. It seems astonishing that such foolish economy of space should be indulged in as much as it is, when so frequently the steam plant is the very heart of the establishment in which it is placed. Such contracted grates are always sinners, when viewed from a smoke offending standpoint, and they are also expensive economies when the coal they consume is paid for.

It is well to remember that the thinner our fuel beds are the less the resistance they offer to the free passage of air through them, yet the bed must not be carried so thin that holes appear in it too frequently, admitting an excess of cold air to chill the gases distilled from the coal. Thin fire beds are, undoubtedly, less liable to produce smoke than thick beds, notwithstanding their liability to be more or less wasteful of fuel.

No fire bed should be so thick as to cause a sluggish fire, which will not soon ignite the fresh coal thrown upon it.

With a given force of draft pressure too thin a bed of coal will allow too much air to pass through. Aside from its chilling effect in the furnace the excess of air supply passes out of the chimney carrying away heat, thus causing a waste of fuel.

On the other hand, too thick a fire chokes the air supply and causes the formation of carbon monoxide, which also involves a loss in economy.

The size of the fuel charged into the furnace has a certain bearing on the depth of the fire bed.

If large lumps are used the depth of the bed necessarily becomes greater, but no lumps larger than the size of a man's fist (which may be easily shoveled into any desired part of the furnace) should be used. In regard to this matter, what has already been said under our consideration of ignition temperatures applies here, concerning the greater facility with which a solid (like coal) ignites and burns when small in size and presenting the greatest exterior surface to the oxygen present (in the air passing through the fire bed).

In the February, 1895, number of the *Locomotive* I find reference made to the fallacy held by many firemen that when a boiler is worked to a high rate of capacity correspondingly heavy fires must be maintained.

Very heavy fires, even when using high class semi-bituminous coal, require an altogether too frequent use of the slice bar (to break up the caked bed of fuel).

This article presents interesting information in the form of two tests which were run to obtain reliable information on this subject, which are given as follows:

"They were made on a 72-inch return tubular boiler having 100 3½-inch return tubes, 17 feet in length." "The heating surface amounted to 1642 square feet, and the grate surface to 36 square feet, the ratio of the two being 45.6 to 1. On the thick fire test the depth of the coal on the grate varied from 8 to 20 inches, being heaviest at the rear end and lightest at the front end. On the thin fire test the depth was maintained uniformly at about 6 inches. The fuel was New River semibituminous coal. The difference in the results as appears from the figures is an increased evaporation due to thin fires amounting to 15.6 per cent."

Condition as to Thickness of Fires.

	Thick fires.	Thin fires.
1. Average boiler pressure, pounds	131.6	130.4
2. Average temperature feed water, degrees	39.6	43.5
3. Average temperature flue gases, degrees	484	487
4. Average draft suction, inches	0.17	0.18
5. Moisture steam, per cent	0.25	....
6. Coal per hour per square foot grate, pounds	13.72	12
7. Ashes, clinkers, per cent	5.1	5.7
8. Horse-power developed on basis 30 pounds from 100° and at 70 pounds, horse-power	140.3	144.4
9. Water evaporation per pound coal, pounds	8.517	9.457
10. Equivalent evaporation per pound of combustible from and at 212°, pounds	10.985	12.234

Concerning the length of grate, where it is possible to regulate this dimension, it should never be over 6 feet long, as that is about the extreme length at which a fire bed can be properly handled.

With coals forming a troublesome crust, which has to be broken up frequently, and also with coals carrying a fusible ash, even shorter grates should be used to facilitate the proper working or cleaning of the fire in the shortest possible time.

It must be remembered that in order to obtain the best results from both smokeless and economical standpoints every possible facility must be provided in the furnace to allow the most constant and ample supply of air to pass through the grate and fire bed, which facts have led to the above remarks on depth of fire bed and length of grates.

As will be discussed later, a certain amount of air admitted above or beyond the fire bed is generally necessary to promote smokelessness and economy, and the introduction of such secondary air is only made necessary by the lack of sufficient air penetration through the grate and normal fuel bed. It is safe to say, within reasonable limits, that the less the requirement for secondary air to complete combustion the less will be our smoke troubles and the greater our fuel economy.

Special Furnaces for Hand Stoking

We have now considered the scientific methods of hand firing, giving the best results from both smoke producing and economical standpoints, and it now becomes interesting to consider the forms of special furnace construction which are used with these methods of firing to insure still further the suppression of smoke and increase of economy.

Enough has been said to show that even the plainest and simplest boiler furnace should be most carefully proportioned to suit the fuel and other existing conditions, in order to secure desirable results, and I regret to say that too little attention has been paid to this matter by many called upon to design boiler furnaces, including not a few boiler manufacturers, who send their boilers to various sections of the country and furnish designs for their settings. Local boiler makers will frequently secure better fuel results with an inferior type of boiler than will a distant manufacturer with a boiler of superior design, owing to the greater familiarity of local concerns with the furnace requirements of the local fuel.

The various special furnace designs in use with their air handling attachments can be grouped under the following headings:

Various arrangements of brick arches and furnace walls.
Arrangements for heating and distributing air above or beyond the fire bed.
Steam jets for intimately mixing the combustible gases with the air supply.
Double sets of furnaces.
Down draft furnaces.
Underfed furnaces.

* Copyright, 1902, by Albert A. Cary.

This last heading carries us somewhat beyond the scope of this article, as the underfed furnace is more properly classed with automatic stokers, but without mention of this special furnace device the subject under discussion seems somewhat incomplete, especially should the reader wish to consider various forms of automatic stokers from the several standpoints offered here.

Concerning automatic stokers I might add that they are, as their name indicates, merely devices to perform the duties of a fireman (as far as possible) by automatically feeding the coal to the fire and for clearing the fuel bed of its ashes and clinkers and discharging them at a convenient place for removal.

Their success with bituminous coal depends upon their feeding small quantities of coal with constant regularity to the incandescent bed of coke previously formed, and in their ability to keep the required (or useful) part of their incandescent bed sufficiently free from ash, clinker and impervious top crust to allow an ample passage of air through it to maintain an approximately perfect combustion.

Various Arrangements of Brick Arches and Furnace Walls.

The fire brick arches built over the boiler furnace, and sometimes extending into the upper part of the combustion chamber, serve two purposes. In the first place they act as reverberatory arches, to send back or reflect the heat they have absorbed (due to combustion taking place beneath them) and thereby maintaining high temperatures in the newly formed combustible gases issuing from the fire bed, and also increasing the tempera ture of the fire bed itself, more or less, and further tending to concentrate the heat of the furnace upon the recently charged green coal, and thereby causing a more rapid distillation of its volatile matter, which rapid distillation is not desirable without a reverberatory arch or its equivalent.

Sometimes these arches are made comparatively short and placed directly over that part of the furnace occupied, during its working, with the green coal and partially formed coke, and such short arches are commonly termed "coking arches."

The second purpose of these arches, when a coking system of firing is adopted, is to prevent the gases, just distilled from the recently charged coal, from plunging upward, away from the highly heated fire bed, among the water tubes of the water tube boiler, or else to prevent them from rushing upward into the fire tubes of the vertical tubular boiler, as has been previously described. I might add that the cool secondary air admitted above the fire bed is also rapidly heated beneath a long fire arch.

Sufficient has been said to show the necessity of maintaining the temperature of the combustible gases up to their ignition temperatures until complete combustion results, and this end is, in a considerable measure, defeated when the gases are allowed to come in contact with the water surfaces of the boiler, which are seldom above a temperature of 350 degrees F. (corresponding to steam under 120 pounds pressure). Such surfaces are therefore (comparatively speaking) very chilly, retarding or suppressing the combustion materially.

Although fire arches are generally conceded to be the best feature of general furnace design for smoke suppression and fuel economy with coals carrying a considerable percentage of volatile matter, the writer has heard numerous complaints following their adoption, due to the constant repairs needed, but investigation in such cases has nearly always shown bad design and workmanship.

The length of the arch should be of sufficient extent to accomplish the purposes set forth above, and no longer. As soon as practically perfect combustion is accomplished the hot gases resulting should be immediately brought in contact with the boiler surfaces to avoid heat losses.

Regarding design and mason work, these are most important matters in fire arch construction, fault in either line being followed by considerable expense for repairs.

It is unfortunate that there are no well established rules for fire arch construction for boiler furnaces, various designers differing considerably in their ideas on this subject.

If we build a circular arch with a rise equal to one-half of the chord of the arch—when such an arch is heated, expanding, it will produce no outward pressure on the side walls, but it will "throw up" in the center and soon become loose in its joints (with successive heatings and coolings); its life is short and frequent repairs are necessary.

Let us suppose a substitute for an arch over the fire bed at the other extreme, formed by laying a series of bricks side by side (the same as bricks are frequently placed along the floor of our ash pits). When such a roofing over our fire bed is heated the expansion will cause no throwing up in the center, but it will force the two side furnace walls apart and cause them to crack and be destroyed.

It is evident that our best form of fire arch must be constructed somewhere between these two extremes, and the writer has generally designed his arches so that the rise (in the center of the arch) will be somewhere between one-eighth and one-tenth of the length of the arch's chord. This makes a rather flat arch, which tends to cause an appreciable thrust on the side walls of the furnace, but this side thrust is much easier cared for (by a proper distribution of buckstaves) than excessive lifting at the center, and I have sometimes let into the brick work (immediately behind the buckstaves) channel iron, placed along the line of greatest thrust against the side walls, which supports the arch well longitudinally.

When in the steel business I experimented with buckstave arrangements applied to heating furnaces having large reverberatory arches. As these furnaces were run for long continuous intervals of time at a nearly constant temperature I had the tie rods (over the top of the furnace) which connected the two opposite buckstaves fitted with turnbuckles. These tie rods were left loose when the furnace was cold, but tightened when the furnace was heated to about the normal working temperature. I found that this practice imposed less destructive strain upon the brick arch and side walls and these needed less repair work than when the old practice was followed of moderately tightening the tie rods before heating the furnace. Such practice is impossible in boiler furnace work on account of the alternate heatings and coolings each day, but the dangerous crushing and thrusting effect of a restrained arch may be overcome without imposing an undue opposing pressure on the brick work by another expedient I have used successfully, and that is by placing a heavy compression spring (like a car spring) at one or both rod ends, so that the spring will be supported between the nut and washer on the tie rod and the outer side of the buckstave's end.

If it is possible to let the brick work breathe (as we might say) within what might be called the elastic limit of the masonry, the repairs to the arch and side walls will be less and the durability of the mason work will be increased.

By resisting the sidewise thrust of the arch we will cause its center to move up when expansion occurs, and in order to provide for this with the least harmful resistance to such motion it is well to build the fire arch as free from its surrounding masonry as possible. Should we load the arch heavily expansion is apt to distort it, so by building the arch free from its outside covering and allowing ample space for its rising motion it will have only its own weight to carry, which is sufficient, if properly designed, to cause it to fall back to its normal cold position. By building an arch free from its outer covering in this way we will leave an air space above it, which if closed at its two ends will imprison a certain amount of air having little motion, which will act as an insulation and decrease loss of heat by radiation. On the other hand, if we open the outer end of this space to the air (at the boiler front), and if we do not carry the arch back to the extreme inner end of the furnace and close it, the chimney draft will cause a flow of air along the space above the arch from front to rear, which air, due to contact with the highly heated bricks or tiles, will become considerably heated, finally leaving this space and

mixing with the gases from the furnace just as they are passing into the combustion chamber.

Fig. 6 will show an arch constructed in this manner which was applied to a water tube boiler setting by the writer. The coal used in this furnace was ordinarily a great smoke producer, running over 40 per cent. in volatile matter.

It proved to be a very satisfactory furnace, being both economical and practically smokeless.

It will be seen that it has a separate inner and outer arch, the top arch forming the outer covering. The amount of air admitted through the furnace front, between the arches, is easily regulated by moving a sliding rod placed along the boiler front just under the arch opening, which is connected to a series of small swinging disks or doors.

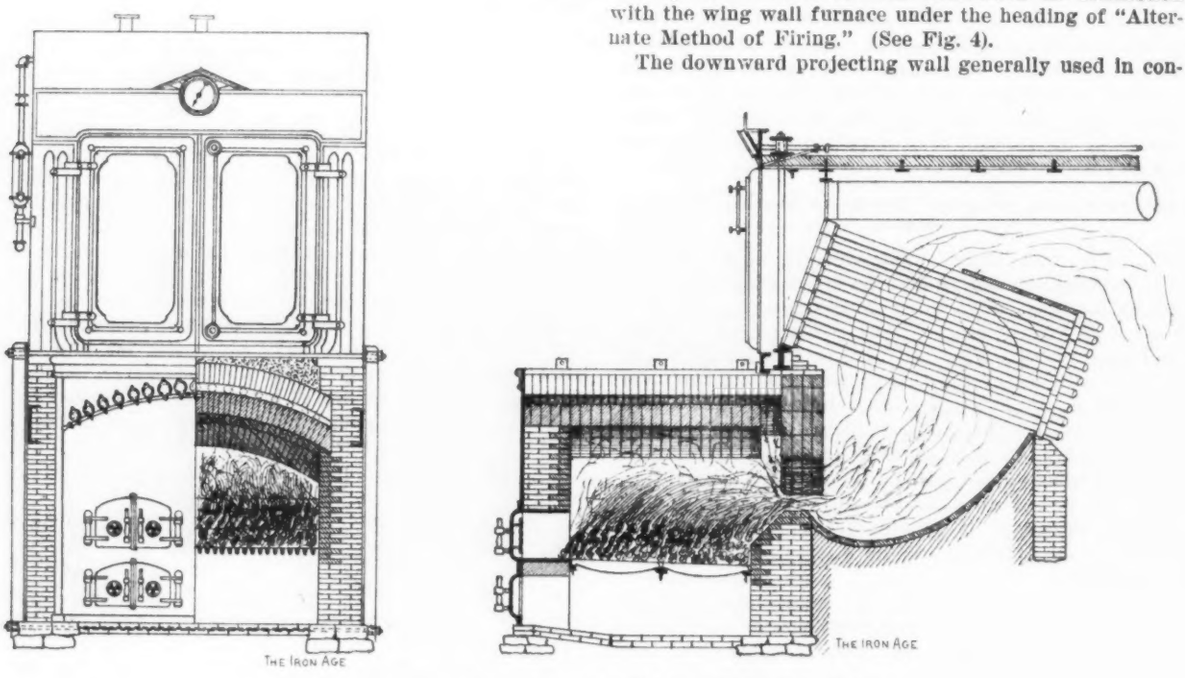


Fig. 6.—Special Form of Arch Applied to a Water Tube Boiler.

At the rear of both arches and over the bridge wall will be seen a third arch dropping lower than the inner arch. This third arch with the bridge wall below it forms a throat way for the escaping gases from the fire bed, to become intimately mixed with the secondary air coming from the space above the fire arch, and a combustion chamber is provided beyond this throat way.

In building fire arches great care should be taken to obtain the best fire brick, accurately tapered to fit perfectly into place, so that they have a full bearing along the entire length of both sides. The joints between them should never exceed 1-16 inch in thickness. The best finely ground and sieved fire clay should be used in these joints, mixed to a creamy consistency, and the bricks should be thoroughly soaked in the same, then rubbed side to side and gently hammered home.

Such an arch, properly designed and restrained, will last for a long time and need very little repairs, but a departure from such construction is certain to be followed by a shortened life and considerable cost for maintenance.

Before leaving the subject of fire arches I might mention another form of arch I have used with very good results. This arch was built in a similar manner to the one shown in Fig. 6, except that the lower arch was continued back to the rear wall (*i. e.*, the third arch over the bridge wall).

A number of the bricks used for the rear third of the fire arch had 2-inch cylindrical holes cast through them for the admission of air from the space above into the furnace chamber.

At times when a considerable amount of gas was being distilled from the coal I found small tongues of flame projecting downward from certain of these holes like the inverted flame of an Argand burner.

I have since found that a similar fire arch has been used in the asphalt paving business, only instead of having holes cast in the fire bricks regular arch brick were used, and they are placed in the arch in such a manner as to leave an open checkerwork spacing between the partial adjoining sides of the brick, thereby accomplishing the same purpose.

In the various arrangements of furnace walls to promote better combustion or better mixing of the air and combustible gases we find side projecting walls and vertical projecting walls.

The construction and use of side projecting walls has already been described and considered in connection with the wing wall furnace under the heading of "Alternate Method of Firing." (See Fig. 4).

The downward projecting wall generally used in connection with an upward projecting wall (*i. e.*, the regular bridge wall) has been used as a method to promote better combustion when the coking method of firing is used, by causing the combustible gases formed in the front of the furnace to plunge under the hanging bridge wall (as it is frequently called) through a bed of incandescent coke which fills the throat way between this wall and the grates. It will be seen that this principle is in a way similar to that used in the down draft furnaces.

Perhaps the principle of operating this class of furnaces can best be introduced by illustrating a special furnace described in C. Wye Williams' work on "Fuel and Combustion," Fig. 7, although this furnace should more properly be described under the heading of down draft furnaces.

The furnace shown in Fig. 7 was invented previous to 1850. It has a front grate set almost horizontally and this grate surface is continued to the rear of the furnace

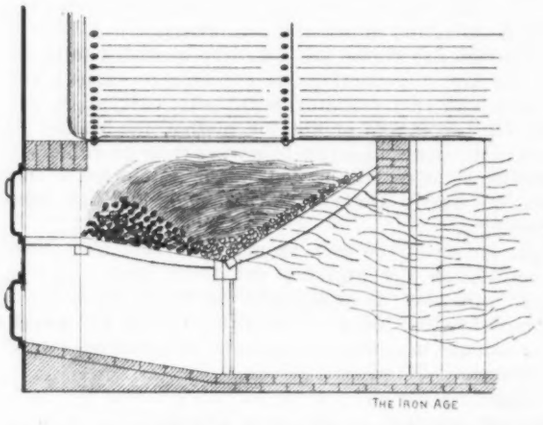


Fig. 7.—An Early and Unsuccessful Down Draft Furnace.

by a rear grate considerably inclined. Under the intersection of these front and rear grates will be seen a partition running from one side wall to the other, dividing the ash pit into two parts. A door is placed in this partition for cleaning out the ashes dropping from the rear grate. It will be seen that the coking method of firing is used with this furnace, the green coal being charged upon the front horizontal grate, and after distilling off its volatile matter the resulting incandescent coke is shoved back upon the rear inclined grates so that the volatile gases distilled from a new charge of coal are forced not only to pass over the bed of incandescent coke in the rear, but they must also plunge through it and through the grates beneath, and after passing under the hanging bridge wall continue on to the combustion chamber.

The failure of this furnace was due to the rapid burning out of the rear grates (due to the intense heat concentrated upon them), and further, it will be seen that the proper introduction of air to this furnace is made well nigh impossible, the greater part of the supply being necessarily secondary air, admitted over the top of the fire bed through the furnace doors. Air thus introduced over the pile of green coal in the front of the furnace must, by chilling, retard materially the distillation of gases from this coal. Still other objections are readily seen, and this construction is quite crude compared with the regular down draft furnace, as will be seen.

In 1785 James Watt (the steam engine inventor) invented a furnace, endeavoring to suppress the smoke nuisance so bitterly complained of at that time.

It consisted of a bridge wall dropping down to the rear of the grate surface and having a series of funnels or pipes placed very near the grate surface, through which the products of combustion were forced to pass.

In 1838 R. Rodda, working on Watt's idea, patented a furnace, illustrated in Fig. 8. It will be seen that he used a hanging bridge wall dropping to within a short

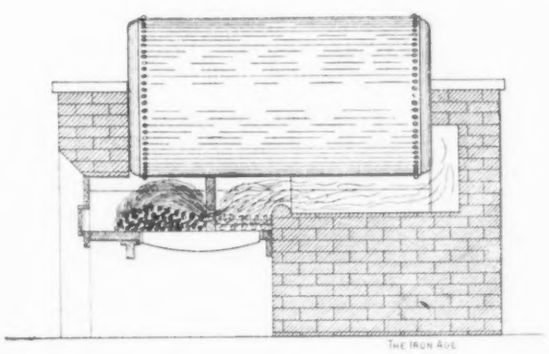


Fig. 8.—The Rodda Patent Furnace, Now Abandoned.

distance from the grate surface, just back of its center. Fresh coal was piled upon the front of this furnace and the resulting incandescent coke was shoved back under the hanging bridge, and by this arrangement the gases distilled from the coal were obliged to plunge through the incandescent coke, filling the throat way, and then pass over the rear bed of hot coke before entering the combustion chamber. A door was provided in the side wall to clean the rear of the fire bed.

This furnace succeeded in suppressing the smoke partially, but, of course, the grate under the inverted bridge wall suffered greatly, which was one of the causes leading to the abandonment of this design.

It will be seen that the air was supplied to the fire bed from the ash pit, this furnace being thus constructed somewhat better in this particular than the one shown in Fig. 7.

This furnace was greatly improved upon in 1862, when N. F. B. De Chodsko patented the furnace shown in Fig. 9.

It will be seen that the trouble due to burning out of grate bars under the hanging bridge wall was overcome by dropping the rear of the grate to a sufficiently low level, the fire bed being manipulated the same as in the Rodda furnace. Better facilities for cleaning the rear grate were provided by placing a special door in front of the lower grate. The obtainable reports do not give a very satisfactory account of the operation of this furnace, but this was doubtless due to faults in proportioning, or else due to the use of coal ill adapted to this form of furnace.

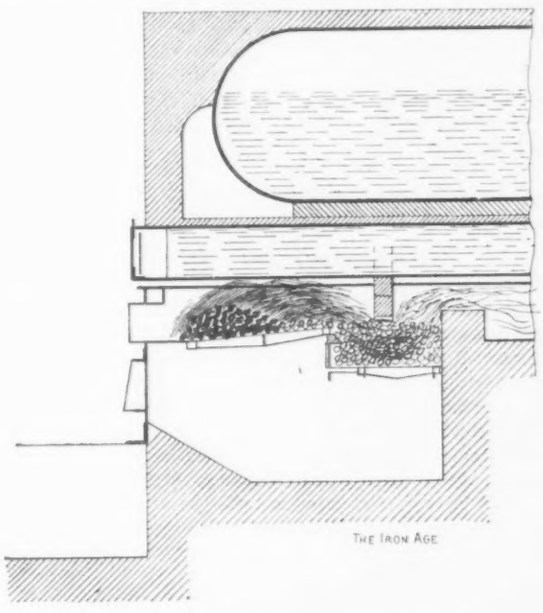


Fig. 9.—The De Chodsko Patent Furnace, Abandoned.

In 1854 W. Woodcock patented a furnace of similar design, shown in Fig. 10, which is reported to have given very satisfactory results, both from smoke suppressing and economical standpoints. It will be seen that this

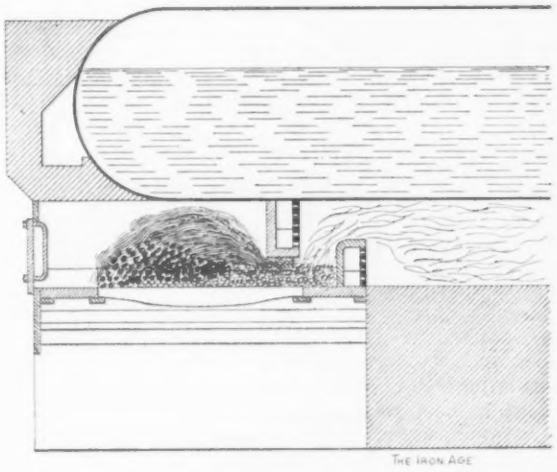


Fig. 10.—The Woodcock Patent Furnace, Reported to Have Given Satisfactory Results.

furnace places its hanging bridge wall much nearer the rear end of the furnace, and it carries its incandescent coke almost entirely on a dead plate. Further, it introduces secondary air back of both the hanging and the regular bridge walls, which are highly heated. This method of supplying air doubtless had not a little to do with the furnace's success as a smoke suppressor.

In the furnaces illustrated in Figs. 8, 9 and 10 it will be seen that the area of throat way under the hanging bridge measures, to a great degree, the capacity of these furnaces, so that when at all forced a very rapid combustion must occur at this place, and with the great heat developed from such rapid combustion the grate bars beneath, in some cases, and the bridge above must soon become highly heated, which great heat tends to destroy them more or less rapidly.

The coal used for these furnaces must form at least a fairly good coke, which can be easily broken up, and it must contain an ample amount of volatile matter to keep a practically constant flow of gas flowing through

the coke bed in the rear of the furnace. At the same time an ample supply of air should be introduced through the incandescent coke bed and in the rear of the hanging bridge, so as to thoroughly mix with the combustible gases, in order to complete their thorough combustion, and the amount of this air should be capable of careful regulation to suit the condition of the fire and the rate of coal consumption, and further, a proper combustion chamber should be provided in the rear of these furnaces.

The Steam Turbine.*

Its Commercial Aspect.

The steam turbine is not as young as it looks. Although its application, in its present several forms, to commercial power generation is the achievement of recent years, its principle is neither new nor novel, and it may be wondered that a century of effort should have been applied to the reciprocating engine, which became, indeed, more complicated as it grew, before the primal theories of the heat motor assumed corporate, practical form. It is true that later knowledge of materials and how to work them has made the way clearer; and the wider use of the steam turbine has in a measure depended upon the development of electrical practice, with which latter it is now so intimately identified.

Much interest has for some time been centered in this type of prime mover and the possibilities of its application. The history of its development is quite generally known, and up to this time attention has been more particularly directed to its engineering and mechanical characteristics. It now seems appropriate to inquire into the controlling features of its commercial utility and determine, if we may, whether the steam turbine, subjected to a somewhat careful analysis, is a machine still to be developed, though of ultimate promise, or whether it has been well tried and its advantages proved. What has it accomplished? What justifies its use? What otherwise unattainable results will it produce? What are its limitations? It is this aspect of the case on which the light is needed.

It is of little moment what the direct or contingent advantages of the turbine may be if its reliability remain in doubt. Offered, as it is, in large units, and being apparently more related to the classes of service which impose the most exacting requirements, the demand is imperative that in this one vital respect there be little left to chance.

Description of Turbine.

Before recurring to actual experience it may be instructive to consider for a moment the general character of the turbine as a type of motor contrasted with the piston engine. Fig. 1 shows the longitudinal section of the Westinghouse turbine. The steam entering the governor valve arrives at the chamber A, then turns to the right, passing first a set of stationary blades, then impinging on the moving blades, driving them around, and so on until it arrives at exhaust chamber B. And here is an interesting lesson in physics—a demonstration of the conversion of heat into energy; for while the temperature of the inlet end is that of the entering live steam the exhaust end, but 3 or 4 feet distant, is not so hot (about 126 degrees F.) but that one may bear the hand on it. The cut will show that the only real moving part is the spindle, revolving in its bearings, the governor mechanism and oiling arrangement being comparatively insignificant. The blades do not wear, as the steam velocity —some 500 or 600 feet per second—is not sufficient to affect them. The blades are made of a special material and are calked in such manner that the force required to pull them out would exceed the elastic limit of the material in the blades. They are subjected in regular practice to a strain of about one-fortieth of this amount. The actual pressure exerted on each blade is about 1 ounce. A complete description of the mechanism is not needed here.* It is sufficient to note its general character and to contrast its obvious simplicity and freedom from complication with the recognized complexity of the piston engine. The inference is clear that in constructive opportunity at least the turbine should be the more reliable.

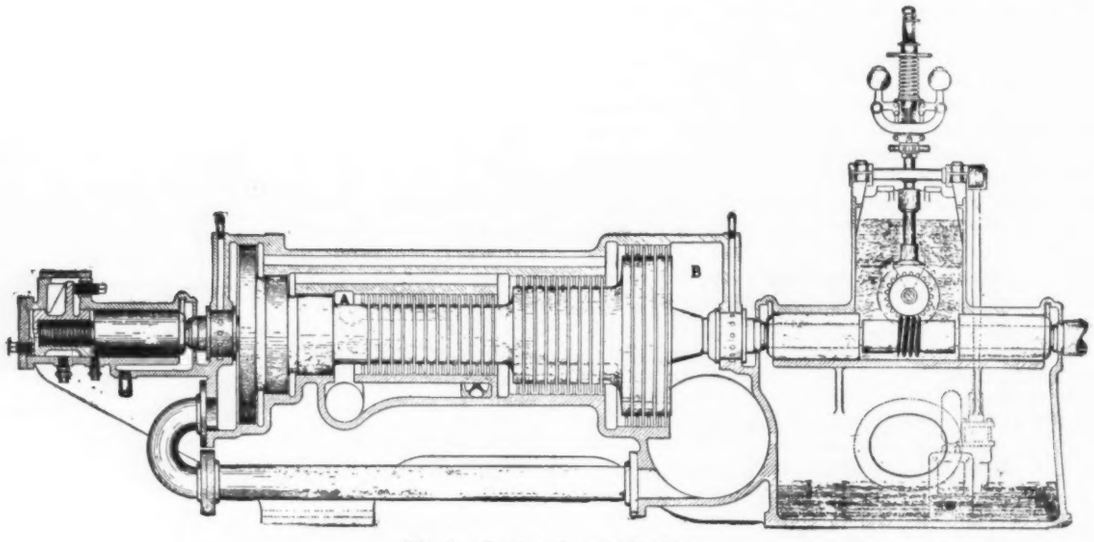


Fig. 1.—Section through Turbine.

THE STEAM TURBINE.

The steam turbine, before it had obtained any considerable recognition here, was not entirely without success abroad. Parsons and others had done much to prove its reliability. For instance, in 1897 the Newcastle & District Electric Lighting Company, operating 11 turbines of 75 to 150 kw. each, showed their cost of repairs and renewals on their entire plant, including turbines, generators, boilers, condensers, pumps, fittings, cables, &c., to be 26-100 of a cent per kilowatt per annum.

Saving by Use of Turbine.

In this country the steam turbine is now operating in several plants. The first prominent installation was at the Westinghouse Air Brake Company's works, at Wilmerding, Pa., where the first unit was started in August, 1899, two more shortly after and the fourth unit in April, 1901. Thus the plant has been in service for the most part more than three years, and the fourth unit about 18 months. The plant operates regularly 11 hours per day, the service being electric power and lighting. With the iron foundry running at night one turbine is run 22 to 23 hours per day. In general the units have run quite to their rated capacity—perhaps within 20 per cent. of it, as a minimum. An interesting comparison has been made elsewhere of the efficiency of this turbine plant with the installation it supplanted, the latter com-

* From a paper by E. H. Sniffin of Westinghouse, Church, Kerr & Co. before the American Street Railway Association.

* See paper read by Francis Hodgkinson before Engineers' Society of Western Pennsylvania, November, 1900.

prising simple and compound engines scattered about the works. After the three turbine units had been placed in opration they were shut down and the steam engines previously in use (not yet disconnected from service) were again started up and a test made. A test was then made of the turbine plant. These were based upon a week's run, careful measurements being taken of fuel and water. The saving of coal in favor of the turbine plant averaged 35.7 per cent during the day and 36.4 per cent. during the night. The saving in feed water averaged 29.8 per cent. during the day and 41.4 per cent. during the night. In round numbers this meant a saving of about 40,000 pounds of coal per 24 hours. This improvement, of course, was attributable not entirely to the turbine itself, but also to the more efficient method of electric power transmission in comparison with the previous scattered arrangement of steam engines, with long runs of steam piping, use of belts, &c. It is, however, instructive as indicating the results accomplished in a specific and prominent case, as between an old and still commonly used system of power transmission and a modern method.

This plant at Wilmerding was the first of its kind. It naturally was not without its minor difficulties. The turbines themselves from the time of starting have been practically free from trouble of any kind. Some armature difficulties were at first experienced—not of enough moment to interfere with operation—and were readily corrected. Summing up the experience had with this first installation, undertaken somewhat experimentally at the time, the net result is that the plant has operated about three years in heavy daily service; that the work has not suffered interruption and that the plant is to-day running with sustained satisfaction and with no visible signs of wear in any of its parts.

The Yale & Towne Mfg. Company, at Stamford, Conn., have a 400-kw. steam turbine furnishing 240 volts, two-phase current at 7200 alternations. This outfit was started in operation February 1, 1902. Since that time it has been in regular daily service, carrying about its rated load, operating ten hours per day, furnishing current for electric motors and some lighting. Up to this time, therefore, it has been in service some eight months and its mechanical operation has been most satisfactory. No quantitive tests have yet been made of steam performance, but there is general evidence of its economical operation.*

Largest Turbine in This Country.

The Hartford Electric Light Company, at Hartford, Conn., have a 1500-kw., two-phase, 2400-volt, 60-cycle, turbo generator outfit, which was started in April, 1901. This, at present, is the largest turbine yet installed in this country. Put in, as it was, to relay their water power, it has not been in constant service, but has usually been required but one or two days a week. At such times, however, it has carried the full station load of some 1800 or 1900 kw. Reference will hereafter be made to its striking economy.

A great deal of interest has centered in this early installation of a good sized outfit in a prominent location and its excellent performance is now generally well known. Some difficulties were at first experienced; nor were they entirely unexpected, for there had been no facilities, as there now are, for testing the outfit before shipment, and it was merely run at the shop without load. Before the machine was successfully in operation one trouble that developed was with lubrication. The packing glands around the turbine shaft leaked somewhat and the construction of the oil passages with reference to these glands enabled the oil to come into contact with the steam, impairing its lubricating quality. This was easily overcome by modifying the vents and employing glands of different construction.

Some time was also required after erection to make necessary adjustments to relieve the turbine of longinal end thrust. This would have been corrected at the shop had the opportunity then been present for making complete test. It was found, too, that the shaft, which had been designed to afford the utmost ease of dismantling, was subjected to a considerable unevenness of temperature under superheated steam and means were taken to make the temperature at all points more uniform. Having in due time overcome these local defects, which partook in no sense of functional fault, the turbine was then in serviceable condition and its operation has since been most satisfactory. And the Hartford Company, notably alert to adopt the newer thing if there seemed advantage in it, have found when their water supply ran short that it paid to run the turbine and allow their Corliss engines to remain idle.

Efficiency of Steam Turbine.

Is the steam turbine efficient? And what, if it may be so termed, is the character of its efficiency? Is it, like the various types of piston engines, peculiarly fitted to certain conditions which permit of little change if economical performance be retained, or is there evidence that the turbine has a greater inherent efficiency that is less affected by attending circumstances?

The interest of engineers in the turbine has, perhaps, been drawn chiefly to the evident possibilities of its steam economy, and to the data already acquired, with the discussion it has provoked, much more of value will be added. We may in a general way, however, without referring to its thermodynamics, obtain from the evidence of actual results some knowledge of its efficiency and determine if the standards of present practice may not be improved.

It is well that the makers of the turbo generator have been compelled to adopt the practice of basing the steam consumption on the unit of output, so that their guarantees are given on the electrical horse-power or kilowatts delivered on the switchboard and not on the indicated horse-power developed. This at once eliminates the factors of engine friction and generator loss and thus more definitely establishes a measure of performance.

One is impressed with two distinguishing features of the turbine's steam efficiency—namely, that it seems to vary but little over wide ranges of load, and, further, that the size of the unit has comparatively little bearing. It follows, then, that if good results are possible at all they are neither restricted to the larger plants nor to the requirement of steady load.

Efficiency at All Loads.

Fig. 2 illustrates this. Herein are given the results of tests on a 400-kw. turbine, made at the builders' works before shipment; a machine having since been in daily

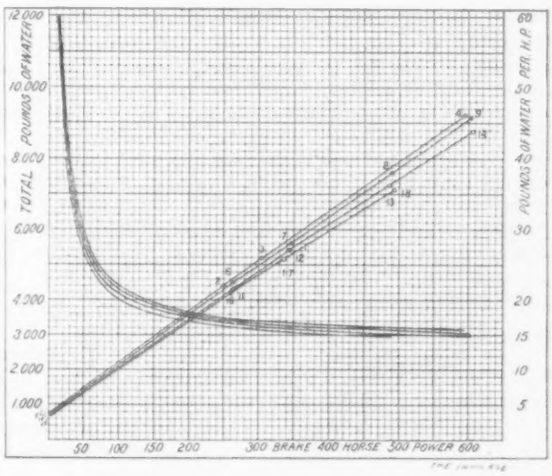


Fig. 2.—Test of 400-Kw. Turbine.

operation some eight months. These tests were conducted under brake load, so that the figures are based on the brake horse-power developed. The rated load would be about 600 brake horse-power. The steam consumption curve is seen to be very flat, graduating from 14.47 pounds at full load to 16 pounds at half rating, and to less than 19 pounds at one-quarter capacity. The relation of the consumption of steam in pounds per hour to the brake horse-power developed is also shown, this line being almost straight. In the tabulation may be observed the interesting comparative effect of vacuum and superheat.

If it is thus shown that with a unit as small as 400

* Report of test of the Hartford turbine was published in *The Iron Age* of October 9, 1902.

kw. we may obtain a result of 14.47 pounds of steam per brake horse-power per hour, corresponding to less than 13¾ pounds per indicated horse-power, it is evident that moderate sized plants may, with the turbine, be sufficiently subdivided to give the maximum flexibility of service with insurance of relay, and yet possess an efficency heretofore identified only with very large units. Further than this, a fluctuating load is not incompatible with high economical performance.

As the units become larger the turbine is then brought into comparison with the best steam engine practice, where it still preserves its uniform efficiency and where its practical advantages are no less evident. In a recent instance a result of 11.7 pounds of steam per electrical horse-power per hour was guaranteed on a turbine of 750 kw. capacity, corresponding to about 10.17 pounds per indicated horse-power, which, though the size is moderate, is perhaps within the ability of but few engines of any size or type that have ever been built.

Test of Westinghouse-Parsons Steam Turbine.

Number of test.	1	2	3	4	5	6
Boiler pressure....	148	147	147	152	149	149
Vacuum referred to 30 in. barometer	27.4	28.04	27.95	27.06	27.35	27.4
Per cent. moisture in the steam....	2.3	2.3	2.35	1.6	....	....
Superheat, Deg. F.	...	...	...	...	7	9
Revolutions per minute 3,687		3,621	3,603	3,615	3,686	3,635
Total water.....780.5		4,354	5,157	9,227	722.7	4,507
Brake horse-power.	0	250	306	595	0	264
Water rate.....	...	17.4	16.8	15.5	...	17.05
Number of test.	7	8	9	10	11	12
Boiler pressure...	148	149	148.5	150	155	148
Vacuum referred to 30 in. barometer	27.2	26.7	26.7	27.37	27.54	27.3
Superheat, Deg. F.	8	9	9	17	20	18
Revolutions per minute	3,626	3,637	3,618	3,688	3,639	3,625
Total water.....	5,587	7,568	9,192	687	4,321	5,435
Brake horse-power	348	489	602	0	263	346
Water rate.....	16.05	15.45	15.26	....	16.43	15.7
Number of test.	13	14	15	16	17	18
Boiler pressure...	149.5	153	150	150	148	152
Vacuum referred to 30 in. barometer	27.3	26.94	27.35	27.5	27.3	27.3
Superheat, Deg. F.	20	20	33	37	37	33
Revolutions per minute	3,638	3,630	3,690	3,630	3,626	3,642
Total water.....	7,249	8,789	669.5	4,190	5,129	7,185
Brake horse-power	487	607	0	260	334	490
Water rate.....	14.85	14.47	....	16.13	15.35	14.67

It may be pertinent to cite a few results obtained in regular service. The turbine at Hartford, under test conducted by Professor Robb, at an average load of 1800 kw., with 155 pounds steam pressure, 27 inches vacuum and 45 degrees superheat, gave a result of 19.1 pounds of steam per kilowatt hour; or an equivalent of about 11.46 pounds per indicated horse-power. An interesting comparison has been made at this plant of the relative efficiency under regular operating conditions of the turbine and their Corliss engines. They have one 18 and 34 x 48 and one 24 and 44 x 60 cross compound horizontal Corliss engine. These engines drive direct by belt one 400-kw. and one 600-kw. generator. The turbine is, of course, direct connected to its generator. They have made comparisons of operation based in each case on rather extended runs. It has been found that the turbine requires in delivering 1900 kw. on the board about the same amount of coal that is used with the Corliss engines to deliver 925 kw., the steam pressure and vacuum being identical in both cases; and this with the engines running at about their point of best efficiency and known to be in excellent condition. Comparisons of this kind, while not scientifically exact, are perhaps of greater interest as a measure of commercial performance.

The data at hand of test on one of the 400-kw. turbines at Wilmerding shows a result of 16.4 pounds per electrical horse-power hour at full load with 125 pounds steam pressure and 26 to 27 inches vacuum. At half load it is 18.2 pounds.

At the Elberfeld Municipal Electricity Supply Works in Germany two 1500 horse-power Parsons turbines, which are run in parallel with two Sulzer horizontal engines, were tested by Professor Schroter, Dr. Weber and Mr. Lindley. With steam pressure averaging 95 pounds, running condensing, and with 18.3 degrees of superheat, the result obtained at maximum load was 19 pounds per kilowatt hour; or about 11.4 pounds per indicated horse-power hour.

Many other results have been recorded, but those given will probably be sufficient to show that under service conditions the turbine has demonstrated its high efficiency.

Is Its Efficiency Maintained?

A question often asked and a very important one, too. Looking at the turbine casually it seems as though there would be little opportunity for any change in its mechanical functions. There is no complicated valve gear to get out of adjustment, no pistons to leak, no rubbing surfaces to set up excessive friction, little chance of misalignment, and altogether there seems to be no good reason why its original condition should ever be very much disturbed. The blades appear to be the vulnerable point, for they do the work and there are a good many of them. Their number, though, is in their favor, and being loaded as they are to only about 2½ per cent. of the pressure they are built for they possess an abnormally large factor of safety. The experience has been that the turbine is less liable to depart from its original standard of performance than any other type of prime mover, and there seems little reason to suppose that it is capable of much deterioration.

A recent interesting investigation along this line was made at the plant of the Cambridge Electric Supply Company, Limited, in England, where they have a 500-kw. Parsons turbine. The outfit was erected in January, 1900, and during the past year has been doing very constant work. After it had operated about eight months a second one was installed. The first outfit had been tested at the makers' works before shipment and showed a result of 24.1 pounds of steam per kilowatt hour at 526.4 kw. And it was for the purpose of noting its performance after a year's operation that Professor Ewing conducted recently a second test.* In this latter test the turbine at 518 kw., under nearly equal conditions of steam pressure and vacuum, gave a result of 25.0 pounds and at 586 kw. 24.4 pounds. In the second instance the turbine, besides trouble experienced with wet steam, was driving its own air and circulating pump (a surface condenser being used), and the steam required to drive these auxiliaries was charged to it. In the test at the builders' works the turbine did not drive its pumps. The results, to use Professor Ewing's words, give most satisfactory evidence that the turbine retains its character as a highly efficient generator.

It remains to be said in this general connection that there will be found in steam turbine practice a more satisfactory treatment of the economy question than has heretofore prevailed. There will exist not only a truer basis of measurement than the indicated horse-power, but there will be opportunity for more thorough demonstration. It is now generally recognized that efficiency guarantees on large engines have little significance. The builder is physically unable to completely assemble and test such engines before shipment, and the user is seldom able or disposed to incur the distraction and expense which a field test involves. It is in the exceptional case, therefore, that actual tests are made and there is still much to be known concerning the economy performance of large engines. It might be said, too, that while builders and engineers generally recognize the elements of design that conduce to efficiency there is no unanimity of opinion as to what those elements will actually produce.

It is, therefore, gratifying to know that one builder, the Westinghouse Company, are now erecting a new testing room in which a complete plant of boilers, condensing and superheating apparatus will afford facilities for testing turbines up to 3000 horse-power at all loads up to full capacity, and larger units up to this point, with practically any steam pressure and wide ranges of vacuum and superheat. Thus the conditions to be met in practice may be approximated in the shop and the information acquired will be of the highest value.

*London Engineering, June 14, 1901.

Comparative Floor Space.

Turning now to one notable feature of the turbine—its compactness—Fig. 3 is a graphic illustration of the floor space it occupies compared with the vertical and horizontal cross compound Corliss engines, the basis of

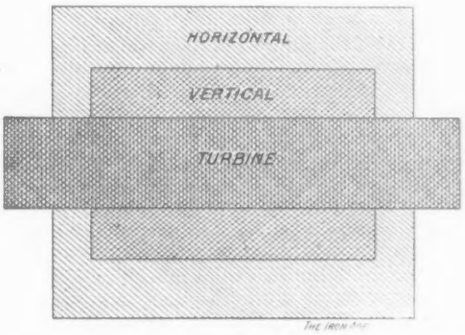


Fig. 3.—Comparative Floor Space Occupied by Vertical and Horizontal Engines and Turbine.

comparison being a 1000-kw. unit, including the direct connected generator, the engine cylinders being 28 inches and 56 x 48 inch stroke, which, at 95 revolutions with 25 pounds mean effective pressure referred to low pressure cylinder, gives about 1400 indicated horse-power. It will be seen that the floor area of the turbine is about two-thirds that of the vertical engine and about two-fifths that of the horizontal. Such comparison, of course, is limited in its application. With each set of conditions requiring special treatment no standardization of space requirements can be established. Still, with the limitation of isolated experiences, it is possible without attempting to establish any universal laws to make some reasonably close comparisons of the space required for the turbine as against the conventional types of engines. It has been thought desirable, then, to take a number of different sized plants, each composed of several appropriate sized units, the selections being as follows:

1,000 horse-power in 2— 400 kw. units.
3,000 horse-power in 3— 750 kw. units.
5,000 horse-power in 4—1,000 kw. units.
*10,000 horse-power in 3—2,500 kw. units.
15,000 horse-power in 4—2,500 kw. units.
30,000 horse-power in 4—5,000 kw. units.
50,000 horse-power in 7—5,000 kw. units.
75,000 horse-power in 10—5,000 kw. units.

These combinations were laid out for the turbines and for the vertical and horizontal cross compound Corliss engines, all with their direct connected generators. A clear space of 7 feet in all directions was allowed and is probably a fair average. The computations were confined to the units themselves with the clearance stated; the disposition of the balance of the plant being assumed to be unaffected by the type of motive power.

Fig. 4 shows the comparison of floor space. The

Floor Space Per H.-P.

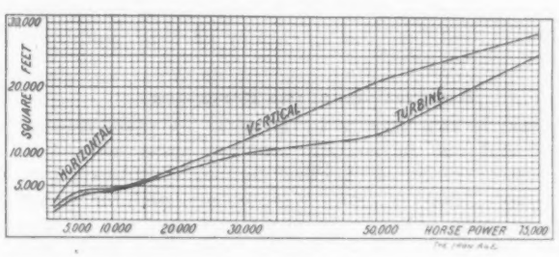


Fig. 4.—Comparison of Floor Space.

curves show the turbine to require about 80 per cent. of the space needed for the vertical and not over 40 per cent. of that wanted for the horizontal. In this diagram the vertical engine compares less unfavorably with the turbine than might generally be supposed, while the horizontal engine curve is about where one would expect to find it. The latter is not carried beyond 10,000 horse-power, this type of engine being practically limited in size to that required for the 1500-kw. generator.

Fig. 5, showing the cubic yards of foundation material required, is at the same time a more exact and striking comparison. The turbine would appear more

Foundation, Cubic Yards Per H.-P.

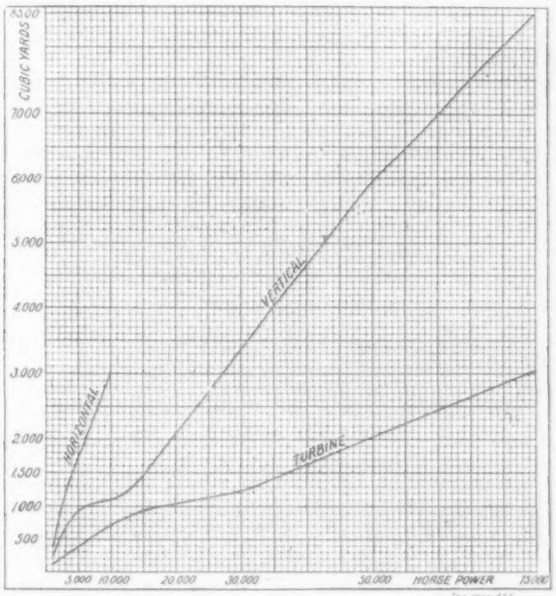


Fig. 5.—Comparison Cubic Yards of Foundation.

advantageously still if the actual foundations needed for stability had been computed. Instead the foundations in all three cases were figured at 15 feet depth to give space underneath engine room floor for condensers, &c., though for large engines this depth is usually inadequate. The only foundation needed for the turbine is that necessary to hold its weight as though it were a tank or some other stationary affair. It does not even require foundation bolts, there being no vertical or horizontal thrusts to be resisted. Comparing again the 1000-kw. units it is found that in actual foundation volume required the ratio of the turbine to the vertical and horizontal engine is that of 1 to 9 and 15 respectively.

In Fig. 6 will be observed the comparison of engine room building space, in which the turbine appears to

Engine Room, Cubic Feet Per H.-P.

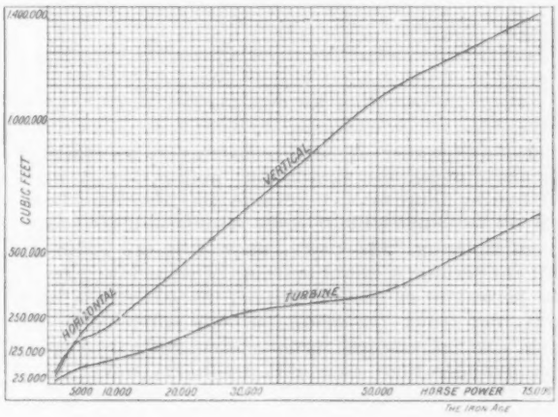


Fig. 6.—Comparison Engine Room Building Space.

hardly less advantage, though in this diagram the horizontal engine, gaining in head room what it lost in floor space, compares more favorably with the vertical. In platting these curves sufficient head room was allowed to accommodate a crane, leaving adequate clearance for handling any part.

Having noted, then, the marked advantage which the turbine appears to offer by virtue of its compactness, it

* In this size the horizontal engine is figured on five 1500-kw. units.

would seem that the comparison might be carried a little further, and with assumed valuations of masonry work and building construction, as well as of land, the money saving to be effected in these important features of initial cost be defined.

Still adhering to the same plant size and combinations of units, in Fig. 7 is found the comparative cost of foun-

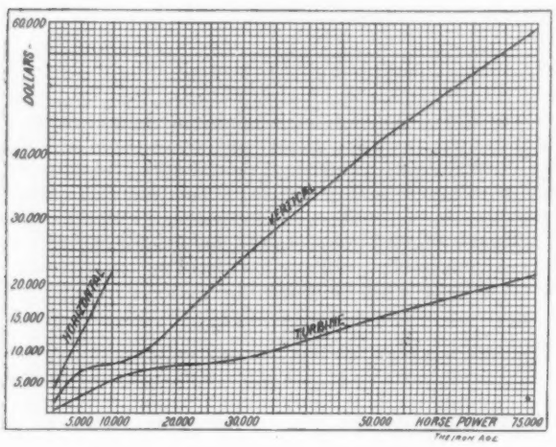


Fig. 7.—Foundation, Cost Per H.-P.

dations; the basis assumed being $7 per cubic yard for concrete, laid. It will be seen that while the turbine seems to average a foundation cost of about 50 cents per horse-power, the vertical engine in the more frequent sizes is approximately $1.50, while the horizontal is not far from $2.50. Not forgetting that all three foundations are figured of equal depth—15 feet—to provide space below, as above stated. In the instances where special foundation work is required, such as piling or otherwise preparing suitable bottom, or shoring up building walls to enable sufficient depth of excavation, the expense avoided by the use of turbines is obvious.

In Fig. 8, showing comparative engine room building cost, the basis assumed is 15 cents per cubic foot of

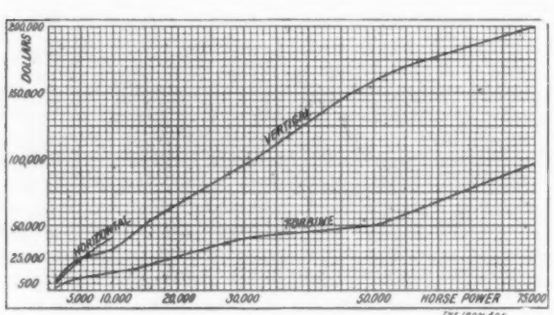


Fig. 8.—Engine Room Building, Cost Per H.-P.

space inside of walls. Building construction necessarily varies widely with the size, design and materials employed, but the figure taken is perhaps not far from a fair average for buildings built of brick with steel trusses and fire proof covering. The curves show that the building cost for the turbine is about one-half of what is required for the horizontal or vertical engine, the latter two, apparently, not being far apart. In this comparison of building cost experience would differ widely. Architectural considerations and local conditions would produce varying results. Exigencies would, however, favor the turbine because of its smaller size and rectangular proportion, and it not infrequently happens that increased power may be supplied by locating the turbine in existing space whereas an engine would necessitate building extension and perhaps the purchase of additional land. An instance of this kind arose at Akron, Ohio, where in the existing space no arrangement could be devised to accommodate additional engine power. It was found possible, however, by rearranging auxiliary apparatus to provide space for one 750 and one 400 kw. turbo generator outfit, which will shortly be in operation.

Fig. 9 gives the comparative cost of land to accommodate the engine room space, the land valuation being placed at $5 per square foot. Whatever may be the

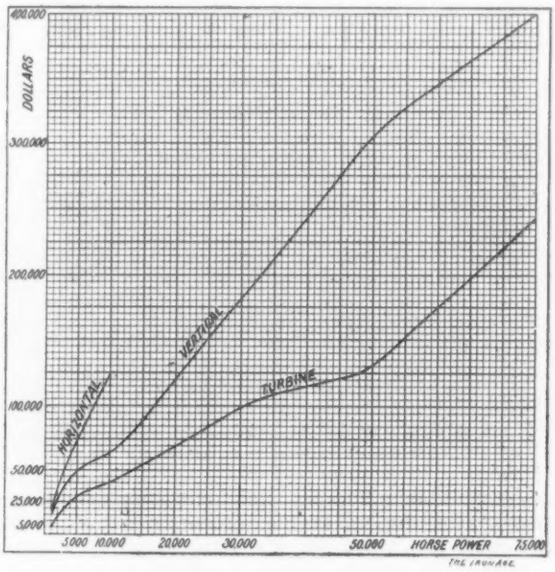


Fig. 9.—Engine Room Land, Cost Per H.-P.

value of land the relative comparison would remain unaffected. Land value, however, is never of minor importance, for desirable power house sites with transportation and water facilities usually cost a good deal. And allotting about ½ square foot of floor space to the horse-power of generating unit, it takes but little figuring where plants are located on expensive ground to show that the turbine in this respect alone may save a considerable part of its first cost.

The last diagram of the sequence, Fig. 10, summarizes the preceding curves and shows, with foundations,

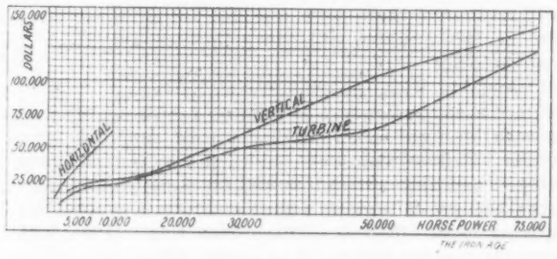


Fig. 10.—Total Engine Room Cost Per H.-P.

building and land at the valuations given, how these factors of cost compare. The data will have served its purpose if it show that in a properly designed plant employing the steam turbine far more money may be saved in these particulars than is ever represented by the difference in cost between machinery of high grade and that of inferior quality.

Illustrations of the Foregoing.

A case or two may be to the point. A plant was recently laid out to contain 1000-kw. units with vertical cross compound Corliss engines. Subsequently three more 1000-kw. units were constructed for steam turbines being ordered. It was found that the turbine saved 900 square feet of engine room floor space and about 38,000 cubic feet. Had the whole plant been originally designed for turbines the saving of space would have been double these amounts and the cost of land, building and foundations been reduced about $50,000.

An electric railroad plant in Ohio was some time ago installed, in which there are two 500-kw. generators direct connected to cross compound Corliss engines. Space was provided for two more units of the same size. For the increased power two 1000-kw. turbine outfits were purchased which will go in the space left and leave room for another turbine of 2000 kw. Thus the engine

room space planned for 2000 kw. is found sufficient for 5000 kw. It is estimated that the boiler plant extension will be reduced about one-third because of improved efficiency. It is figured, too, that asaving of $2900 was effected on each 1000-kw. foundation.

One other case of perhaps greater interest recently came to notice, that of a plant of 8100 kw. capacity, laid out on modern lines employing vertical cross compound condensing engines. There is no space for additional engine power and any increase would require building extension and encroachment upon valuable land. It was shown that without going beyond the present building walls and without disturbing the existing machinery the plant might be doubled in capacity by installing turbines in the space available below the present engine room level and adding another deck of boilers. And it has been figured that this arrangement would effect a reduction of over $3 per kilowatt per annum in the present interest charge.

With some measure thus obtained of the comparative indirect expenses of installation we may turn to consider the cost of the turbo generator outfit itself. Is it high in price, or is its cost, if not an attractive feature, still within our common idea of value? The answer is that its price is reasonable; that, indeed, where the comparison is fair the turbine will require the lesser first investment. It is, unhappily, quite as difficult to compare the costs of the turbine and piston engine as to compare the costs of engines themselves. A thing is, of course, high or low in price by comparison, but where the steam engine is concerned to measure values were a hopeless task so long as there are held divergent views of design and construction and of engineering adaptation, with the builders themselves wide apart in their practice.

There are engines of good workmanship and of poor, of heavy proportions and light, and generous and scant proportioning of cylinder size and ratio, and of piston speed, to the work to be done. Perhaps, too, the voice of experience may protest that the buyer's insistence on his bargain is not always in keeping with the quality he would have or should have, and it is not surprising that commercial necessity should sometimes affect engineering ideals. While the reliable builder will adhere to his high standards there still will be found those whose more flexible practice will suffer impairment of quality to fit the price.

Proceeding with the comparison, however, it may be assumed that the larger field for the turbine begins about where the high speed engine leaves off. Its steam economy at once identifies it with the most efficient engine practice and it therefore applies more appropriately to the classes of service where medium and large size units are used. The comparison, then, lies generally between the turbine and the slow speed engine. It remains merely to take an engine and generator of good construction, bring the engine efficiency as nearly as possible into parity with that of the turbine, also having it possess the same overload capacity, to find that the turbine is reasonable in price. And when we add the possible saving in foundations, buildings, &c., the first cost of installation is usually much in its favor.

There remains still one or two important features of electric power plant operation wherein the use of the reciprocating engine is attended with difficulty and with respect to which the steam turbine offers unquestioned improvement.

Advantages of Turbine for Generator Service.

One of these—the running of direct connected alternating current generators in parallel—has come to be a frequent requirement; but frequent as it is and essential as it is, its accomplishment has been anything but an exact science. There has in fact been so little synchronism of method as to justify some wonder at the results that have really been obtained. There is no need here to particularize the complications of the problem. It obviously is not the work of the tyro to introduce into two or more units the identical conditions that will convert reciprocating motion into synchronous rotating motion, correlating as he must the features of governing functions, inertia of reciprocating parts, fly wheel weight and radius and the like. And it becomes evident that where successful parallel running is achieved it is the triumph of skill not only in design, but in the handling of the machinery itself.

These difficulties cease with the turbine. In it there is no fluctuation of angular velocity. There is but one direction of motion, with no element to detract from even turning moment, and due to its speed there is stored up more fly wheel effect than is present in the piston engine.

It is therefore found that not only do steam turbines easily run together in parallel as hydraulic turbines have always done, but it may be expected that they will operate with piston engines and the performance of the latter in this respect be much improved. In electric railroad work especially is this feature of the steam turbine of much interest, for it is well known how irregular loads accentuate the difficulties of regulation. Furthermore, the question of operating high frequency apparatus in combination electric railroad and lighting service may be more satisfactorily approached.

Superheated Steam.

The feature next in importance, perhaps, is that of superheated steam. It is now quite generally recognized that superheating is of advantage, though there is still much about it to be learned. Future investigation, however, in which the turbine will take important part, will reveal more precisely its economical status, and it may be hoped that before long the net advantages derivable from different high steam temperatures will be known. Meanwhile superheaters are being installed, and collaterally the problem of handling superheated steam has assumed inportance. Engine builders themselvesare feeling their way, for while some appear to unrestrictedly offer the Corliss valve for superheat work others seem prone to confine it to the more conservative temperatures and others still reject it altogether and hold to the poppet valve where superheat is employed.

The turbine may be used unreservedly with superheat of any feasible temperature. It has no internal rubbing surfaces, and there are no glands to become injured. Also, as no cylinder oil is required there is no opportunity for lubricating trouble. Furthermore there seems to be with the turbine rather more proportionate benefit from superheat than with the piston engine, because of diminished skin friction.

Having said that the turbine requires no cylinder lubrication the inference follows that the steam is therefore uncontaminated with oil, and that the exhaust, when condensed, is pure distilled water. This is true, and while it is of little consequence where water supply is abundant and good and cheap, it becomes, where conditions are otherwise, of exceeding importance. In many sections of the country where the water contains either mud or scale making impurities the cost of repairs to boilers, with the expense in labor and interruption of service entailed by constant cleaning, is a besetting evil, and to alleviate this trouble large surplus boiler plants are often installed. As a usual thing, too, difficulty is experienced in attempting to extract oil from exhaust steam.

To recur once more to this feature of lubrication in the turbine, it may be remarked that it is an item of very little expense. The bearings are the only points requiring oil, the lubricant being circulated around under pressure. The reservoir being once charged very little is needed to maintain the supply.

Advantages.

Finally in this commercial consideration of the turbine one other question should perhaps not be omitted, one in fact which sometimes seems to outweigh almost every other—namely, how long does it take to get it? While the demand has in truth for some time exceeded the capacity for production (there being now under construction at East Pittsburgh some 44,000 kw. on order), so that the turbine has required about as much time to build as everything else, the extended facilities now nearing completion will better this considerably. Certainly under normal conditions these outfits, made of comparatively small parts with no enormous pieces to be handled, ought to be quickly built, and what is quite evident, they can, when delivered in assembled condition,

be so readily installed that the months sometimes required to erect large engines will be reduced to weeks.

If it is, then, seen that the steam turbine in all the essential aspects of its commercial utility appears to stand on solid ground, there cannot be yet attributed to it the virtue of universal application. It has its field chiefly in electric lighting and power work, though in small sizes it has been extensively used for driving blowers, pumps and other devices. Its speed, of course, prohibits belt drive.

But the direct connected electrical generating unit has been the *sine qua non* of modern power development, and the reciprocating steam engine, under the stimulus of opportunity, has been brought nearly to its mechanical and thermal limit. With all the ingenuity and skill and patient effort that have marked its growth; with its notable achievement, symbolizing, as it does, the march of industrial progress, it still remains, even in its most advanced form, a wasteful and complicated means for converting heat into energy. If we are to exact further tribute from the agency of steam; if we would hope to reduce complexity and by a more simple, reliable and durable method of operation reduce the interest and maintenance charge; if, in a word, we would improve the standard of existing practice and surmount many of its illustrations, we must then change the character of our medium, employ different principles and give to the generation of power a new and greater significance. The steam turbine seems destined to mark the way.

Lake Ore Matters.

Ore Shipments and Vessel Rates.

DULUTH, MINN., October 18, 1902.—Up to the close of this week there had been shipped out of the upper lakes for the season about 22,500,000 gross tons of ore. There remain 2,500,000 to 3,000,000 tons to be moved, so say shippers, and this will go forward less rapidly. But at the least calculation all ore will be down, excepting from a few scattering mines, well before the season ends. A considerable business in up bound freight is expected very late in anthracite coal, and there is sure to be an immense tonnage of grain down as long as insurance will permit. There is now sold at Duluth for shipment all the wheat and flax that can be brought there and to other Lake Superior terminals, and receipts of these grains are about 5,500,000 bushels a week, mostly at Duluth, with some at Canadian head of the lake ports. This means a good many ships. Ore rates have strengthened 5 cents a ton this week, and are now at 80 cents from the head of the lake. I get it from good authority that the coming year the Pittsburgh Steamship Company, the leading chartering interest in ore each spring, will be willing to make a rate of around 85 cents a ton, as against 80 in 1901 and 75 for the present season. The company expect that not only will more ore be pressing for shipment, but that the amount of other freight, especially of coal, corn and wheat, will be far above the present volume, and that additional tonnage, on the construction of which every shipyard on the lakes is working as busily as possible, will not be more than sufficient to care for the business, even with the better dispatch promised at several lower lake unloading ports.

Recent Sales of Ore Properties.

I referred briefly last week to the sale of the Penobscot Mine to the Union Steel Company. Some additional particulars may be interesting. The mine will be managed by O. B. Warren, until lately assistant manager of the Mahoning Ore & Steel Company's Mesaba properties, and since then manager of the Volunteer Mine, Marquette range, for the Union Steel Company. It will be the effort of the new owners, who have already taken hold, to largely increase the average of 250,000 tons, which seems to have been all the former owners were able to produce annually. This was not more than sufficient to cover the allotment under contracts for the National Steel Company. This contract was a valuable asset for the National Company, and has more than once stopped negotiations for the sale of the Penobscot Mine. The price paid for the two steel ships that entered into the sale was $630,000, and the total consideration is now estimated as at least $2,500,000. The cost of pumping the Penobscot's water was very heavy until two years ago, when a fine cross compound Corliss pumping engine of Prescott make, capable of 5600 gallons a minute against a 310 foot head, was installed in a chamber underground. Since then the cost sheets have shown about 4 cents per ton on the output for the water. With a larger output this will be somewhat diminished.

The sale of the Elizabeth Mine, Mesaba range, to Pickands, Mather & Co., which has been on for some time, has finally been closed for the sum of $380,000. The Commodore Mine, which has been closed for two years pending negotiations for a reduced royalty, is to be unwatered and reopened. It is not understood that any reduced royalty has been secured. The Stevenson Mine has produced this year to date about 1,150,000 tons, and is still shipping as heavily as possible in an effort to make an even 1,500,000 tons for the season.

Labor Statistics for the Copper Country.

The report of the inspector of mines for Houghton County, which covers the majority of the copper mines of Lake Superior, shows that 14,130 men are employed there. Figuring those in other and adjacent counties the total number in the copper mines of Lake Superior is about 16,000. The 14,130 is in contrast with 13,500 a year ago, 14,000 two years ago and with about 7000 in 1895. In this time the percentage of fatal accidents has remained, except for some unusual seasons, about stationary, averaging about .004 per cent., though in some years it has dropped to below .003. It is interesting to note that the number of men employed last year was almost exactly double that of 1890, when the production was 101,000,000 pounds, and was also double that of 1895, when the production was 129,000,000 pounds. Increase of production, therefore, has by no means kept pace with the additional forces employed, nor, what is still more significant, with the improved machinery at work. It is notable that the mining machinery of the copper country has been almost entirely replaced with the latest and best known since 1895. About 2000 fewer men are employed in and about Calumet and Hecla than two years ago, and the increase of the year comes very largely from the group south of Houghton, the Baltic, Champion and Trimountain and from the Mohawk to the north and the Mass and Adventure to the west.

There is to be a very elaborate ceremony at the opening of the power canal of the Michigan Lake Superior Power Company at Sault Ste. Marie this month. Invitations have been sent broadcast to leaders in many lines of thought, invention and industry, and the Consolidated Lake Superior Company, who own the canal, are preparing to make the event one of especial note.

An Important Legal Opinion.

The Attorney-General of Minnesota, who has been investigating the alleged merger of the Duluth & Iron Range and the Duluth, Missabe & Northern roads, consequent on their ownership, though a series of consolidations, in the United States Steel Corporation, has announced that in his opinion there is no way in which a suit may be brought against these roads for violation of the State law prohibiting the consolidation of parallel or competing lines. He finds the situation with respect to these roads very different from that in respect to the Northern Pacific and Great Northern, in their merger into the Northern Securities Company, but says that if his associates of counsel are of the opinion that the State can proceed against these roads he will do so, for he has been requested by the Governor to carry on a suit if possible. He does not hold out any hope to opponents of these roads that he can make a suit stick and the probability is that the last has been heard of the expected cases.

A French newspaper has received reports that the Santa Fé Railroad have bought from De Wendel & Co. 12,000 tons of steel rails at 110.50 francs per metric ton, delivered at Dunkirk or Antwerp.

The Mesaba Range.

The Origin and Development of the Ore Deposits.

WASHINGTON, D. C., October 21, 1902.—An exhaustive report upon the Mesaba iron bearing district of Minnesota has been prepared for the United States Geological Survey by Charles K. Leith, in which the subject is discussed from a commercial as well as a scientific standpoint, special attention being paid to the present methods of production, ownership, reserve tonnage, &c., and a chapter being devoted to suggestions for the further exploration of this famous district. The report is one of a series being prepared by the experts of the Survey designed to cover in detail the Lake Superior region.

In discussing the origin of the Mesaba deposits it is stated that the ores are shown to develop mainly from the alteration under surface conditions of green ferrous silicate granules, as first pointed out by Spurr. The green granules, however, instead of being glauconite, as maintained by Spurr, have been found to have a composition corresponding approximately to the formula $FeSiO_3H_2O$, and have been given the name greenalite. Their devopment is believed to be analogous to that of the iron carbonates of other parts of the Lake Superior region. That is, the iron was carried to the Upper Huronian ocean in solution, probably as carbonate, was precipitated as ferric hydrate, was buried with the vegetable material and reduced to the protoxide form, and was then combined with silica to form ferrous silicate. In the Gogebic district, where silica was not present in so great abundance, the protoxide combined for the most part with carbon dioxide to form iron carbonate. The development of iron silicate in the Mesaba district and the development of iron carbonate in the Gogebic district are analogous with the development of zinc silicate with the zinc carbonates in Missouri, where chert was abundant in the formation, and the comparative absence of zinc silicate with zinc carbonate in Wisconsin, where silica was less abundant. The shapes of the granules may be due to replacement of minute shells, such as those depositing glauconite or those giving shape to the grauules of much of the Clinton ore.

The iron ore deposits of the Mesaba are similar to those of the other Lake Superior ranges in the following respects: 1. They are concentrates from an original ferrous iron compound. 2. They have been concentrated by surface waters bearing carbon dioxide and oxygen. 3. They are located where the circulation of waters has been most vigorous. 4. They are in pitching basins, at least in part bottomed by impervious strata.

The Mesaba iron ore deposits differ from those of the old ranges in the following features:

1. The original material which by its alteration has given the iron ore in the Mesaba district, while a ferrous compound of iron, is mainly a silicate rather than a carbonate.

2. The pitching basins in the old ranges are formed by a folded impervious formation or by the intersection of the impervious formation with a dike, as in the Penokee-Gogebic district. The ore lies against the impervious wall rock at the bottom and also to a considerable extent at the sides. In the Mesaba district the layers of ore grade laterally into layers of wall rock and are continuous with them (though perhaps showing minor disturbances at the contact). They touch the limiting impervious stratum only near the bottom horizons.

3. While the impervious basements of the old ranges are always pitching basins, the impervious basements beneath the Mesaba deposits are sometimes synclinal and sometimes monoclinal.

4. The Mesaba ore deposits are for the most part shallow and have great horizontal dimensions, while those of the old ranges are deep and narrow. The Mesaba deposits are seldom deeper than 300 feet, and may have a considerably greater horizontal extent—in some cases more than a mile. Deposits of the old ranges may reach a depth of 2000 feet or more, and seldom have a surface extent greater than a few hundred feet. On the Mesaba range the areal extent of the ore deposits is about 4 per cent. of the entire iron formation, while in the old ranges it is less than 1 per cent.

5. The pitch of the deposits is uniformly less steep in the Mesaba range than in the old ranges. Average pitches range from 10 to 20 degrees.

6. The Mesaba ores are much more hydrated than the ores of the old ranges, with the possible exception of those of the Gogebic range, and they are on an average of a softer character.

Methods of Mining.

Because of the soft character of the Mesaba ores and their occurrence in shallow deposits much of the ore may be loaded directly by steam shovels on railway cars in open cuts. In 1901 about half of the Mesaba ore was mined by a steam shovel. This method is used in the Stevenson, Mahoning, Sharon, Mountain Iron, Oliver, Sauntry-Alpena, Fayal, Biwabik and Stephens mines. The Fayal mine, however, shipped a small part of its ore by the milling method.

The milling system is used in connection with certain of the softer Mesaba ores—namely, in the Norman, Auburn and Duluth mines and in part in the Fayal and Sparta mines. About 12 per cent. of the Mesaba production for 1901 was mined by this system. The glacial drift is removed as in open cut steam shovel mining; a shaft is sunk in the adjacent wall rock to the level of the bottom of the deposit and drifts or cross cuts are run out to the ore; uprises, or chutes without timber, are sent up into the ore from the cross cuts or drifts; by blasting the ore is then loosened at the surface and pushed into the chutes by men with rods and shovels; it falls into the cars stationed at the bottom of the chutes, is trammed to the shaft, and thence hoisted.

Caving and slicing systems are used in the Penobscot, Burt, Sellars, Hull, Rust, Pillsbury, Clark, Union, Chisholm, Spruce, Commodore, Adams, Genoa, Sparta, Elba, Franklin, Hale, Kanawha and Roberts mines. They are used in part also in the Fayal mine. About 37 per cent. of the Mesaba production for 1901 was mined by these methods. Shafts are sunk, usually in the ore close to the wall rock and in some cases in the wall rock, well toward the bottom of the deposit, although in places not to the bottom, because of the irregularities there likely to be encountered. Drifts or cross cuts are run out, either diagonally or in rectangular systems; timbered raises are sent up to the top of the deposit, and the ore drawn in from the top by drift slicing. The bottom of the drift is planked. As soon as one level or slice has been removed the surface or glacial drift is allowed to fall in, or is blasted in, being kept from mixing with the ore by the planking at the bottom of the first level. Then another slice is taken out below on a sublevel, the planking and the surface allowed to fall in as before, and so on, always working down.

In the rooming or square set method rooms consisting of three sets about 21 feet wide are run up from the main drift to the top of the deposit, the sides being lagged. Pillars of ore of about the same size as the rooms are left. The glacial drift is allowed to fall in from above, filling the rooms. The intervening pillars are then taken out by slicing either from the top or bottom.

Tramming is done mainly by hand or with mules, although of late electric haulage has begun to be introduced.

Comparative Cost of Methods.

A discussion of costs is out of place in a report the subject matter of which is mainly geological; but even from the above cursory description of mine methods it must be apparent that in general the open pit method of mining is far the cheapest of the methods employed; that the underground methods are the most expensive, and that the milling methods are intermediate in cost. The cheapness of the open pit shovel method as compared with the underground mining is due to the large production possible, to the fact that timbering is not necessary, fewer men are required, lighting expense is less, all the ore can be moved (while in underground method perhaps 10 to 20 per cent. is lost), the ore can be better sorted, it has to be handled but once, tramming

cost is saved, and the hoisting is by locomotive on a grade rather than through a shaft.

If open pit steam shovel mining is much cheaper than the underground methods, the question naturally arises why any of the Mesaba ores are mined by any other method. In order that a deposit may be worked satisfactorily with the open pit steam shovel method it must have a considerable horizontal extent as compared with its length in order to afford proper grades to the tracks. The deposit must lie in a position to allow of an easy grade to the approach. This condition is met where a deposit is on a side slope. The thickness of the drift to be removed must not be too great, for otherwise the cost of stripping will run up the total cost of mining. There must be available ground accessible with easy grades on which to deposit the dirt stripped off from the ore body. If there are capping layers of poor or unsalable ores these must be removed before the good ore can be mined. Or if it is desirable to remove interstratified layers of good and poor ore independently it is not practicable by this method. Finally, the annual production must be large. With anything but a large annual production the interest on the preliminary investment on stripping, rolling stock, &c., necessary before a pound of ore can be moved runs the price of ore per ton up to a high figure. This preliminary investment is in most cases large.

On the other hand, when a deposit is opened up by an underground method there is little preliminary investment; no great mass of stripping has to be removed and disposed of; no layers of poor ore have to be removed before the good ore can be reached; the accessibility of all parts of the deposit does not depend on grade; the mine can be worked all the year round; finally, the ore taken out while the mine is being opened goes to defray current expenses and to pay interest on the investment. Thus it is that while, where conditions allow it, open cut mining costs less than half of that of underground mining, in many cases it is still advisable to use underground methods. The milling method is a combination of the open cut and underground methods, and combines some of the advantages and disadvantages of both. It costs less than the underground methods of slicing and caving, because the timbering is less and a greater percentage of the ore is saved, but it costs more than the open cut steam shovel method because of the shafts, drifts and uprises, the tramming and hoisting.

Transportation.

The Mesaba iron ores are transported to Lake Superior by rail, and thence by lake to terminal lake ports. The average haul is about 75 miles. Three railways carry the ore—the Duluth, Missabe & Northern, the Duluth & Iron Range, and the Eastern Railway of Minnesota. The Duluth & Iron Range Railway carries the ore from the following mines shipping ore in 1902: Auburn, Fayal, Elba, Genoa, Sparta, Roberts, Hale, Malta, Kanawha, Spruce (part), Union, Norman, Franklin (part), and Corsica. The ore is delivered to Lake Superior docks at Two Harbors, Minn. The docks are five in number, with 776 pockets and storage capacity of 162,040 tons. The same railway also carries the ore for the Vermillion iron range and the docks serve for both ranges. The Duluth, Missabe & Northern Railway carries the ore from the following mines: Adams, Ætna, Duluth, Canton, Pillsbury, Cincinnati, Sellers, Burt, Oliver, Day, Hull, Rust, Ohio, Franklin (part), Biwabik, Minnewas, Missabe Mountain Iron, Lone Jack, Williams, Mountain Iron, Cloquet and Spruce (part). The ore is delivered to Lake Superior docks at West Duluth, Minn. These docks are three in number, with 960 pockets and storage capacity of 167,040 tons. The Eastern Railway of Minnesota hauls ore from the following mines: Chisolm, Clark, Columbia, Commodore, Mahoning, Penobscot, Sauntry, Stevenson and Union. The ore is delivered to Lake Superior docks at Superior, Wis., two in number, with 500 pockets and a storage capacity of 103,000 tons.

The largest interests in the Mesaba district control their own lake steamers. The largest fleet, of course, is that of the United States Steel Corporation, which numbers in the neighborhood of 120 vessels. The total number engaged in the iron ore traffic on the lake at the present time does not exceed 160.

Production.

In 1891 the district had not been opened up. In 1895 the Mesaba district became the largest producer in the Lake Superior region, that year passing the Marquette district, which, since 1854, had held first place. In 1901 the total production of the Mesaba district was 44 per cent. of that of the Lake Superior region, and 2½ times as much as its nearest competitor, the Menominee, which in 1901 for the first time surpassed the Marquette district in production. The combined production of four of the largest producers in the Mesaba district for 1901, the Mountain Iron, Fayal, Adams and Mahoning mines, was greater than the total for the entire Menominee district for the same year. Beginning in 1899, the Fayal and Mountain Iron mines have shipped over 1,000,000 tons each year, a record which has been made by no other mine in the world. The Fayal shipment in 1901 was 1,656,973 tons, an amount almost as great as the shipment for the entire Vermillion range for the same year. Largely on account of the Mesaba production the State of Minnesota in 1901 passed the State of Michigan as the largest iron producer in the United States. In total shipments since opening up, the Mesaba district is still behind the Marquette district; at the close of 1901 the Mesaba district had shipped a total of 40,404,967 tons, while the Marquette district, open since 1854, had shipped 62,847,473 tons. At the present rate of production the Mesaba total will pass that of the Marquette district in about four years.

Reserve Tonnage.

The tonnage of individual deposits ranges from a few thousand tons up to a possible maximum of 70,000,000 tons. Several deposits are known to have between 20,000,000 and 40,000,000 tons of ore. The total amount of ore of high grade—that is, containing above perhaps 58 or 59 per cent. of metallic iron—at present in sight on the Mesaba range has been estimated at 400,000,000 to 600,000,000 tons; 500,000,000 tons is the commonly accepted figure. Of this 20 to 25 per cent. is Bessemer ore. These figures are necessarily based on incomplete data, but they are commonly accepted by those best qualified to judge. Ore running below 58 or 59 per cent. in metallic iron is known to be present in enormous quantity, but the amount has not been estimated nor are the data for an estimate likely to be available for some time to come. Within recent years steps have been taken to reserve the best of it. Ores running even as low as 40 per cent., while not exploited, are being put aside by the large companies for future use. At the mines where it has been found necessary to move low grade ores in order to get at higher grade ores, the low grade ores are in some cases being stock piled where this can be done at a small cost.

The aggregate amount of high grade ore in sight up to 1902 on all the "old ranges" of the Lake Superior region has been thought not greatly to exceed 250,000,000 tons. Even if the estimates for the Mesaba range and the old ranges are considerably away from the truth, it is apparent that the Mesaba holds a commanding position in the region in its reserved tonnage. When it is remembered that even before the discovery of the Mesaba ores the Lake Superior region was regarded as the richest iron ore bearing region in the world, it is apparent that the Mesaba district has no rival.

Ownership and Control.

To give a full and accurate list of the owners of the iron ore properties would require an amount of labor which is scarcely warranted by the scope of this report, which is primarily geological. Moreover, the list would be out of date at a number of points before the books came from the printer, so rapidly are the newer properties changing hands. But in order to show the extent to which the control of the ore is concentrated into a few hands, the names of the parties controlling the shipping for 1901, and the mines operated by them, are given below:

United States Steel Corporation.—Adams, Ætna, Auburn, Biwabik, Canton, Chisholm, Clark, Cloquet, Day, Duluth, Fayal, Genoa, Lake Superior group, Minnewas Mountain Iron (and

Rathbone), Norman, Ohio, Oliver, Pillsbury, Sauntry, Sellers, Spruce. In 1901 the United States Steel Corporation mined about 72 per cent. of the total Mesaba production.

Republic Iron & Steel Company.—Franklin (Bessemer, Victoria, Pettit, Kinney).

Pickands, Mather & Co.—Elba, Corsica.

Interstate Mining Company (Jones & Laughlin Steel Company).—Columbia (Lincoln, Grant).

Donora Mining Company (Union Steel Company).—Monessen, Donora.

Colonial Mining Company.—Hale, Kanawha.

G. A. St. Clair.—Malta, Sparta.

Corrigan, McKinney & Co.—Stevenson, Commodore.

Sharon Ore Company.—Sharon.

Mahoning Ore & Steel Company.—Mahoning.

Biwabik Mining Company.—Biwabik, Cincinnati (part).

Duluth Furnace Company.—Williams.

Eddy Brothers.—Penobscot.

Harry Roberts.—Roberts.

In most of the properties other parties are concerned, either in the fee or lease, but not directly in the operation of the mine. If the names of all such parties were given it would appear that the Eastern Railway of Minnesota (Great Northern interests) stands well up among the leading iron ore interests, and if the iron ore deposits not yet opened up for mining were taken into account the Eastern Railway would probably stand second only to the United States Steel Corporation.

Exploration.

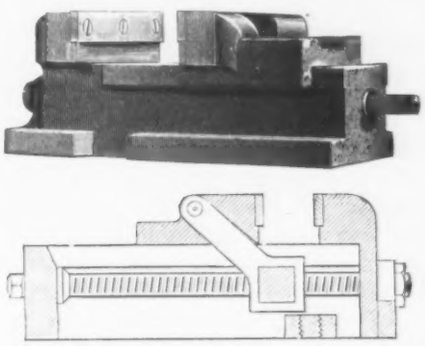
Exploration for iron ore in the Mesaba district is partly a matter of chance, as it must be in any ore-bearing district, and particularly in a district heavily covered with glacial drift. The iron ore thus far found in the Mesaba district, however, has been within certain limits. Ore is confined to the Biwabik iron formation of the Upper Huronian series. Where exploration has been insufficient, as in the western portion of the district, further work will show changes in the iron formation boundaries. Examination of the drift may help to determine the boundaries in doubtful areas, for it is an observed fact that fragments of the iron formation have not been carried far in great abundance. The drift fragments have been carried in one direction, from northeast to southwest, and the discovery of iron formation rocks indicates that the iron formation must be either beneath or to the northeast. Magnetic work may also be of assistance in locating the iron formation. In the productive portion of the district the iron formation is essentially nonmagnetic, yet over the area of the formation the magnetic attraction everywhere shows minor disturbance which is particularly marked near the northern boundary of the iron formations.

If the concentration of the ore deposits is dependent upon vigorous circulation of the underground water it may be suggested that the apparent flattening out of the Mesaba range toward the west may not give the waters of this area a sufficient head to circulate vigorously through the iron formation and concentrate the ores. The low grade and sandy nature of the ores also may be in some way connected with this feature. However, it may be that the rock surface still has a considerable slope which has been covered and obscured by the drift, and if this is the case there is no apparent reason why ore should not be there developed. Certainly exploration for ore is warranted far to the west of Grand Rapids. Being confined to the part of the iron formation not covered by the Virginia slate the ore bodies for the most part lie between elevations 1450 and 1750 feet above the sea level. Most of the iron formation north of the slate is between these elevations, so that this is simply another manner of stating that the iron ore is in part of the iron formation not covered by the slate. The ore deposits frequently underlie depressions. Their secondary concentration has been largely, though not entirely, along synclines; the leaching out of silica during concentration has caused a decided slump in the deposits; subaerial and glacial erosion has cut down the deposits perhaps to a larger extent than the surrounding harder rocks. The heavy and irregular mantle of drift deposit over the area by the glacier has tended to obscure such depressions, but in a large number of cases the underlying rock trough receives some expression in the overlying drift. The ore deposits are seldom or never covered by any considerable thickness of barren rock for any large proportion of their area, although shelves and irregular masses of rock will project from the walls out over the deposit or into the deposit, or islands of rock may be surrounded above, below, and on the sides by ore. Thus ore deposits are not looked for beneath a great thickness of barren rock.

The question has been asked, "What are the chances of finding ore in the Lower Huronian and Archean rocks?" Iron ore is known in both series in other districts of the Lake Superior region and there is no *à priori* reason why ore should not be found in either or both in the Mesaba district. However, both series are fairly well exposed, have been thoroughly examined, and not only has no iron ore been found, beyond a few ferruginous discolorations in the hornblende schists, but no iron formation rocks have been discovered. Stray fragments in the conglomerate at the base of the Upper Huronian show that iron formation rocks were present in the Lower Huronian and Archean areas, from which the fragments of the conglomerate were derived, but this may have been a considerable distance outside the Mesaba district, perhaps from the Vermillion. Exploration should be governed by the above conditions so far as they are known, but it is never possible to know all of these conditions in advance of exploration. When the district was first explored none of them were known. To-day but a part of them are available for locating exploration, but all of them may be of assistance in interpreting the facts brought to light after exploration has once begun. W. L. C.

The Hill Machine Tool Vise.

A new machine tool vise designed by the Hill Tool Company of Anderson, Ind., is here illustrated. It has been so constructed as to obviate the lifting tendency of



THE HILL MACHINE TOOL VISE.

the sliding jaw, which causes chattering and necessitates driving the work down against the bottom of the vise. To overcome this objection, in the new vise the nut is always in advance of the sliding jaw, thus drawing the jaw down to the base the instant the work touches the jaw; the result is the rigid clamping of the vise and work. The body of the vise is made of cast iron and of a form to give it the greatest amount of strength consistent with the least material. The soft steel jaws are detachable, the screws are of steel, the nut of brass and the links of drop forged steel.

A new contract for the supply of coal has been entered into between the Dominion Coal Company and the New England Gas & Coke Company of Boston. The old contract was for the supply of the ovens up to a maximum of 1000 at $1.90 per ton. The new contract provides that the New England Gas & Coke Company receive their present supply for 400 ovens at about the same price and agree to a sliding scale of prices for additional coal above the requirements for 400 ovens.

The total amount of gold held by the United States Treasury reached another high water mark on October 16, with an aggregate of $599,195,722, a sum greater than that ever before held by any nation.

The Iron Age

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JOHN S. KING, - - - - - - - - - - BUSINESS MANAGER.

Labor and the Anthracite Coal Strike.

While it is acknowledged that some potent factors are operating toward a reaction, it is generally recognized in the business world that one of the chief dangers threatening our present prosperity is the unrest of labor. The discussions growing out of the anthracite coal strike and the turn which affairs have taken have encouraged an attitude on the part of labor leaders which emphasizes rather than mitigates the threatened evils. Labor naturally desires to secure a maximum share of the prosperity which all industrial classes are enjoying, and the claim that cost of living has advanced in a marked degree is a good excuse, if not in itself a justification. No one will blame workingmen for taking advantage of their opportunities. It is and always must be a never ending fight, all sentimentalities to the contrary notwithstanding. The remuneration of labor resolves itself into a matter of demand and supply. New fangled notions like that put forward by Mitchell in his letter to the President can never prevail. Labor has no right to a share in the profits of industrial undertakings. They will always be the rewards for the risks which capital takes, one of which is that labor will be in a position to demand an advance in wages which commercial conditions do not enable the employer to recover from the consumer.

Nor has labor any more an absolute right to a minimum wage than there is a right to a minimum return on capital, be it in the form of interest or profit. If a man has put his money into a business which does not pay he must draw it out as best he can, or, failing in that effort, lose it. If labor cannot get adequate remuneration in one occupation the surplus crew must turn into other channels of work. That may mean suffering in both cases, but such is life. Little sentiment is wasted on stricken capital, but there is endless shedding of tears over labor and an amount of sentimental coddling which is not alone misplaced but also dangerous to the victim, since it twists the ideas of workingmen.

Lately the claims of a third party have been pushed forward vigorously and the situation has been seriously complicated thereby. The doctrine is advanced that the public, or the consumer, has paramount rights which both labor and capital must bow to. As a matter of fact the public, or the consumer, has no abstract right as a party in industrial production. So long as private property is sacred, so long, for instance, as the mineral wealth is an appendage of surface ownership, just so long it is not a matter of right for the consumer to demand that minerals be extracted in his interest. One may hold, as many governments do, that mineral ownership is divorced from surface ownership and is the property of the State, but that is another matter.

But while the public, or the consumer, has not an abstract right, it must be recognized that the public has the might, and prudent men will act accordingly, as the coal operators have done. The intervention in the anthracite coal strike of the President of the United States has been an act backed by that might and as such must be deplored, whatever the outcome may be.

No one will deny to labor unions the right to secure as much as the demand and supply of workers will justify, so long as they keep within the bounds of the law of the land, which must protect every individual, be he ever so humble, in certain fundamental rights, among which is the opportunity to contract freely for his own services. Within such restrictions the labor unions are entitled to every advantage which they can capture. The trouble is that the possession of power does not always imply a judicious exercise of it, and it is in this respect that the labor unions often sin and are now in danger of going too far.

The producer is not enjoying any special privileges from the State, and therefore he has no duties to it like the railroads with their charters and their powers of eminent domain. Yet any manufacturer is guided in the policy which he pursues very largely by the requirements of his customer, the consumer or the public, as the case may be. The success of business management largely rests upon a judicious handling of the interests of the consumer, which the labor union is never mindful of. The history of industrial contests has again and again shown how reckless labor unions are even of the sufferings of fellow workmen in collateral or dependent callings.

The issues of the anthracite coal strike have been warped by sentiment, honestly sympathetic we believe in most cases, but woefully mistaken. The contest has been characterized by an abuse of power with which there has been endless temporizing when an emphatic reminder of submission to fundamental and paramount duties should have been the very first consideration, irrespective of the convenience or even the suffering of the public.

The Bond Purchases.

Fifteen years ago, when Charles S. Fairchild was Secretary of the Treasury, there was a large surplus revenue and no bonds were due. The policy of going into the market and buying bonds at a premium was open to considerable criticism, mainly of a political character. In portions of the country there had been so much denunciation of the "bloated bondholder," as the stump speakers described him, that the administration was a little cautious about paying the bondholder more than the face of his bond, except so far as it was necessary to buy bonds in order to meet the requirements of the sinking fund law. The matter was very properly referred to Congress and the Ways and Means Committee reported a resolution, passed by both branches of Congress, which declared it lawful and proper to invest the surplus in bonds at the premium necessary to obtain them. In describing this transaction, however, Secretary Fairchild showed how much more profitable it would have been to the country to reduce taxation than to collect a surplus and use it in buying not due bonds at a premium. Between April, 1888, and the date of the Secretary's report in the fall of that year $94,000,000 of bonds were bought at a premium of $18,000,000. The saving in interest was about $27,000,000, but Mr. Fairchild argued that the money was worth to the Government only 2 per cent., and it was worth 6 to the people, who lost $56,000,000 during the period the bonds had to run by excessive taxation to retire this lot of bonds.

Since Congress passed the resolution authorizing the purchase of bonds as a means of reducing the surplus, bond purchases have been a common thing. The last

report of Mr. Gage shows that in the fiscal year 1901 there was bought for the sinking fund over $14,000,000 of bonds at a premium of nearly $2,000,000, and premiums of nearly $13,000,000 were paid in exchanging bonds at higher rates for 2 per cents.

In private business there would be no question about the wisdom of the transaction. If a man has notes outstanding and plenty of idle money he can hardly do better than to take up his own obligations. There is a disposition to criticise Secretary Shaw for the price he paid and for releasing this money just at this time when there is a speculative boom which ought to be checked rather than stimulated. As to price and time he has abundant precedents. In September of last year Secretary Gage offered 140, a little more than Secretary Shaw offered the other day, for bonds of 1925, and under that offer he bought $26,118,470 with premiums aggregating $7,062,037. The purchase was made to relieve the money market, which was tight, as it almost always is at that season. Last year between April and October nearly $50,000,000 was disbursed in principal and interest to reduce the surplus and relieve the market.

The national bank reports show a reduction of specie and legal tenders between July and September of $61,000,000, of which $40,000,000 was lost by the banks of New England and the Middle States, while last year the loss for all the national banks was only six or eight millions, and there was practically no loss in this section of the country, where the disbursements in bond purchases had replaced the moneys shipped West and South. The money due to other banks, which is largely the balances of Western and Southern banks with banks in this section, or the balances of country banks with the banks in reserve cities, decreased last year between July and September $28,000,000 for the national banks of New England and the Middle States. This year the amount was reduced over $40,000,000 in New England and the Middle States. The national banks of the Central Western States have reduced their debts to other banks $6,000,000, and their specie and legal tenders nearly $18,000,000. The truth is that there has been an exceptionally heavy demand on the banks for actual money to use in handling the crops, and there would have been serious trouble if the Secretary had not found ways of disbursing a good deal of public money.

Pittsburgh as An Iron Center.

A realizing sense of the almost hysterical activity in the iron industry is brought home to every visitor to Pittsburgh and the series of districts of which it is the industrial center. That city and its environs show a bustle and an activity which, we venture to say, has never been equaled in this country. We question whether there is anywhere anything which for productive activity in iron and steel manufacture can approach both the banks of the 40-mile stretch of the Monongahela River. So far as the conformation of the ground permits, one huge plant crowds its neighbor, and new works are steadily being added. At Clairton, Donora, Monessen, magnificent establishments are in course of construction. And when it is considered that other sections of the Iron City, and other districts, like the Mahoning and Shenango Valleys and Wheeling, are likewise flourishing, some conception may be obtained of the magnitude of operations and the promise of even greater things to come. There is hardly a plant in which extensive improvements and betterments are not under way. On every hand there is evidence not alone of an abounding prosperity, but of a determined effort to create plants which shall have ample capacity to resist the reaction when it does come. One cannot help reaching the conviction that the great section of which Pittsburgh is the center is destined to achieve even more striking greatness. The virility and progressive spirit of many of the oldest of her producers are as notable facts as the liberal manner in which the newer works are being equipped.

Pacific Coast News.

SAN FRANCISCO, CAL., October 15, 1902.—Messrs. Epperly and Ross, expected in this city from Shanghai on the 1st inst., have not yet come to hand, but they have been heard from. They have communicated with their friends in the city and their mail has been sent north. A couple of days ago they were in North Yakima, Wash., and are expected here every day. They have no doubt visited Washington to look up its lumber resources and will probably make a trip through our redwood and sugar and white pine districts, with the same object in view. For some years Oregon and Washington have shipped more or less lumber to China, and now California is beginning to ship common or merchantable redwood, as it is variously termed, and which is sold at $13 to $14 per 1000 feet for export. The prospective visit of these gentlemen to San Francisco has excited a good deal of interest among our merchants and has been deemed worthy of note at a meeting of the directors of the Chamber of Commerce. Mr. Epperly is well known to some of the leading merchants of this city.

The regular fall trade has set in with great activity, and the houses in the lines represented by *The Iron Age* have no cause of complaint. They never did as good a business as they are doing now. The exchanges of the Clearing House have been particularly heavy for the past two weeks, more than 20 per cent. in excess of those of 1901 for the same time, with nothing special, like the payment of an Eastern syndicate for the united railroads, to swell them, as was the case some months since. The unusual clearings come more from the hardware, iron and steel trade than from any other, as this is the season when more supplies of these goods are needed.

The export movement has been large during the past couple of weeks. In that time the following have been the principal shipments: October 1, "Gerard C. Tobey," Honolulu, machinery, $6653; October 4, "Coronado," Honolulu, machinery, $5000; October 4, "City of Panama," Central America, machinery, $3747; October 4, "Alameda," Honolulu, machinery, $2675; October 7, "Curacoa," Mexico, pipe, 303,624 pounds, $11,700; October 9, "Nevadan," Hawaiian Islands, machinery, $1394; October 11, "Andrew Welch," Honolulu, pipe $1376; October 11, "City of Sydney," Central America, pipe, $290; October 11, "Enterprise," Hilo, machinery, $379. Then the China steamers were well represented. The "Nippon Maru," October 7, had for Japan machinery valued at $17,602; for Korea, $312; for Japan, agricultural implements, $447; for China, $1189; for Japan, watch movements, $3525; automobiles, $1600, and bicycles, $5518. For China there were bicycles valued at $325.

The "Peru," which cleared to-day, had bicycles, $10,708 for Japan and $323 for China; wire, $680 for Japan; hardware $1279 for Korea, $148 for China and $362 for Japan; machinery, $1265 for Japan, $6605 for China and $5000 for Manila; typewriters, $500 for China and $70 for Japan; sewing machines, $1000 for China and $100 for Japan.

This is doing quite well for a couple of weeks. Of the machinery a good deal is electrical, and here the shipments are increasing every day. It will be noted that there is a good deal of pipe. This is generally manufactured in this city and is principally used for irrigating purposes. Where the machinery is used for mining purposes it is generally supplied from this city, not otherwise. For instance, the replacing of the mill destroyed by the fire at Klamathon will take, say, $200,000, mostly machinery, and it will all have to be imported from the East. J. O. L.

Misleading Reports on Oil Burning Furnaces.

WASHINGTON, D. C., October 21, 1902.—The publication of misleading statements purporting to foreshadow the findings of the special board of the Bureau of Steam Engineering of the Navy Department, which for many months has been engaged in experimenting with liquid fuel, has caused much annoyance to the officials of the bureau, who are deluged with correspondence based upon the assumption that the board will report adversely upon the efficiency and general utility of petroleum as compared with coal. A press dispatch which appears to have been very widely circulated is quoted in many of these communications and appears to be the cause of the general misunderstanding. In this dispatch it is stated that the board has prepared a preliminary report "which is not favorable to the installation of oil burning furnaces;" that the board "tried 14 different oil burning appliances, but the results show that even with the best possible inventions of this character and every care in using them the outcome was far below what has been claimed by the inventors and agents of oil companies;" that "even with oil at $1 per barrel, the results would not be as good from an economical standpoint as with the use of coal;" and that "another point made by the board unfavorable to liquid fuel is that extraordinary care must be taken in handling it and storing it on board war ships to insure safety."

In commenting upon the statements above quoted Lieutenant-Commander Edwards, president of the board which has conducted this investigation, asserts with considerable emphasis that the report will not bear out this forecast, which evidently has been made with a very slight understanding of the objects of the experiments. The chief points to which the board's investigations concerning liquid fuel were directed were as follows:

1. Its evaporative efficiency as compared with coal. 2. The degree to which its consumption can be forced. 3. The value of liquid fuel briquettes as a combustible as compared with coal and oil. 4. The relative value of steam and air as atomizing agents for spraying the oil. 5. The simplest and best means of heating the air requisite for combustion, since it is exceedingly probable that the gasification of the oil product is greatly assisted by heating the air entering the furnace. 6. The effect of oil upon the tubes and plates of the furnace. 7. The simplest and best means of storing the oil. 8. Precautions to be taken to prevent fire or explosion. 9. The comparative value of leading types of burners.

It will be noted that the question of the relative cost of oil and coal is not touched upon, although indirectly embraced in the problem of evaporative efficiency. So far as the naval service is concerned, however, the increased efficiency of oil as compared with an equal weight or bulk of coal is the chief point to be considered provided its consumption can be adequately forced. Every cubic foot of bunker space and every pound of weight that can be saved in the construction and equipment of a war ship means an additional margin for thicker armor plate, more powerful machinery, and a larger quantity of ships' stores. The cost of fuel, therefore, is a secondary consideration, especially when it is remembered that if larger quantities can be carried from ports of departure in the United States less will need to be purchased at coaling stations, where the cost of fuel is inordinately high.

It is recognized, of course, that so far as the merchant marine is concerned these points are not of so much consequence as in the navy, but nevertheless they are highly important, especially to passenger and fast freight steamships. With regard to the relative cost of oil and coal the deductions of the board are only tentative, for reasons which are easily explained. Not only is the use of crude oil in its infancy, but lack of transportation facilities from the oil fields to the leading ports of the Atlantic have made freight rates extremely high, and it is the opinion of the board that there will be a very material reduction in the near future. Oil selling at 30 cents per barrel at the wells costs $1 by the time it reaches New York. It is calculated that a freight rate of $2 per ton is levied upon a product which is in convenient form for handling and can be stored compactly, and this rate is regarded as exorbitant.

On the basis of oil at $1 per barrel, however, it is calculated that its relative efficiency is equal to that of coal at $4 per ton. For general purposes a very simple formula has been devised which may be thus expressed: The cost of oil, in cents per gallon, multiplied by two, equals the cost, in dollars per ton, of coal. Thus, with oil at 4 cents a gallon, the equivalent price of coal is approximately $8 per ton. This formula in detail may be presented as follows:

$$x = \frac{2240 \times 0.04}{7.6 \times 1.5} = \$7.86.$$

In this formula the ton of coal is taken at 2240 pounds, the price of oil at 4 cents, the weight of a gallon of crude petroleum at 7.6, and the relative heat producing power of oil as compared with coal at 1.5. This formula is founded upon fixed principles, and in the opinion of the board will hold at all times and in all places.

In speaking of the general application of the deductions made by the board, Commander Edwards says:

"It will not be the navy, but it will be the country at large which will be the great beneficiary of these experiments. It almost seems providential that the Department should have inaugurated this extended series of tests months ago, and even before there was even a hint that there might be a probability of a coal famine. When the results of the liquid fuel board are made public it will cause thousands of inventors to work along proper lines, and there will be an impetus to the use of oil fuel that will be very surprising. It is more than likely that the tests will be continued for the next six months. The board is receiving valuable suggestions from outside parties, and the leading experts throughout the country are watching the experiments with great interest.

"It is earnestly to be hoped that at the next session of Congress another specific appropriation for testing liquid fuel will be made under the auspices of the same board. That appropriation, however, should include the burning of oil in small volumes, so that its advantages and disadvantages for even domestic purposes could be ascertained. The work now being done by the board includes the manufacturing and maritime problem of burning liquid fuel, but the national peril that overhangs the country in the scarcity of coal makes it absolutely essential that the question of oil for domestic uses should also be investigated by a Government board of experts. While the naval board appointed to investigate the liquid fuel problem has been particularly directed to inquire into the engineering or mechanical features of the question, the individual members have personally interested themselves in other features of the question." W. L. C.

Cleveland's New Machinery Warerooms.—On November 1 the Cleveland office and warerooms of the Marshall & Huschardt Machinery Company will be removed to 24 and 26 Lake street. The new warerooms will afford a better location than the present ones, as they are just about a block from the Union Passenger Station. The ground floor will be 60 x 150 feet and will have large show windows for displaying machines. It is intended to have a number of electrically driven machines in operation built by the following concerns whom the company represent in the Cleveland territory: Bullard Machine Tool Company, boring mills; Cincinnati Milling Machine Company, Lodge & Shipley Machine Tool Company, lathes; Bickford Drill & Tool Company, radial drills; Cincinnati Planer Company, Cincinnati Machine Tool Company, drill presses; Binsse Machine Company, horizontal boring mills; Landis Tool Company, Universal grinders; Gould & Eberhardt, shapers and gear cutters; Baker Bros., key seaters; Jas. Clark, Jr., & Co., electrically driven tools of various kinds; L. W. Pond Foundry & Machine Company, planers; Ferracute Machine Company, presses; Whitney Mfg. Company, hand milling machines; American Engineering Works, steam hammers; National Machinery Company, bolt cutters.

The Standard Chain Company.

The Board of Directors of the Standard Chain Company, with offices in the Frick Building, Pittsburgh, have decided to reduce the capitalization of that concern from $3,000,000 to $1,500,000. A special meeting of the stockholders of the company will be held in a short time for the purpose of voting for or against the proposed reduction in capitalization, but there seems to be no doubt that it will be made. A circular letter, dated York, Pa., October 16, 1902, and signed by John C. Schmidt, president, has been sent out to the stockholders of the Standard Chain Company, which reads as follows:

To the Stockholders of the Standard Chain Company.

Dear Sirs: At a meeting of the directors of your company, at which there were present in addition to the undersigned Directors A. S. White, J. T. Davis, Frederic F. Culver, Robert Rigney, Charles H. Hayden, Franz Krein, Eli Attwood, Peter Wertz and Robert Garland, the members present were unanimously of the opinion that a change should be made in the capitalization of our company, and I was directed to submit the proposition to the stockholders for their consideration and action. The plan suggested is that the capital stock shall be decreased from $3,000,000 to $1,500,000, and in order to effect this that present issue of $1,500,000 of preferred stock and $1,500,000 of common stock be retired, and that the authorized capital stock of the company be fixed at $1,500,000, consisting of 15,000 shares of common stock of the par value of $100 each. The proposition provides that holders of the present preferred stock are to receive one share of common stock for each share of preferred stock held by them, and that the holders of four shares of common stock are to receive one share of the new common stock in exchange; fractional differences to be adjusted by scrip certificates exchangeable for aliquot proportions. The advantages of the plan are as follows:

1. All stockholders will be alike interested in one class of stock, which on the reduced capitalization will make the market price of each share of the new issue of stock not only actually but relatively higher than the market prices of the present capital stock recently prevailing.

2. The reduction of the authorized capital of $3,000,000 to $1,500,000 will produce a saving in annual franchise taxes payable to the State of New Jersey alone of about $1000.

3. With all directors, stockholders and officers holders of the same security, the possibility of a conflict of interests is avoided, and with the decreased capital stock such as is proposed, it is believed that your directors will be able to pay to the stockholders regularly quarterly dividends, commencing next year.

In view of the foregoing facts your directors are of the opinion that the advantages to be derived from such reduction and exchange are sufficient to make it expedient that the same should be effected. JOHN C. SCHMIDT, President.

The Standard Chain Company were organized on March 14, 1900, under the laws of New Jersey. The capital stock authorized is $1,500,000 7 per cent. noncumulative preferred stock, of which $1,031,400 has been issued, and $1,500,000 of common stock, of which $1,277,200 has been issued. There is a bonded indebtedness of $700,000 6 per cent. gold 20-year sinking fund mortgage bonds. The amount of bonded indebtedness issued is $608,000, of which $588,000 is outstanding. Two dividends of 1¾ per cent. on the preferred stock have been paid, one on May 15, 1901, and the other on November 1, 1901, since which date no dividends have been paid. The properties and plants owned by the Standard Chain Company are as follows:

Baker Chain & Wagon Iron Mfg. Company, Allegheny, Pa.

P. Hayden Saddlery Hardware Company, Columbus, Ohio.

Garland Chain Company, Rankin Station, Pa.

Bower & Mallery, Carlisle, Pa.

Nes Chain Mfg. Company, York, Pa.

John C. Schmidt & Co., York, Pa.

Franz Krein Chain Company, St. Mary's, Ohio.

Franz Krein Mfg. Company, Marion, Ind.

Lebanon Chain Works, Lebanon, Pa.

Falls City Chain Works, Jeffersonville, Ind.

H. P. Nail Works of American Steel & Wire Company, Cleveland, Ohio, being their machinery and good will of the chain manufacturing business.

South Harrisburg Chain Works, Harrisburg, Pa.

In addition to the above the company built a new plant at Braddock Station, Pa., at a cost of $105,000.

The products are: All grades of hand made and machine made chain, including common coil, B. B., B. B. B., stud link, conveyor, ships' cables, dredge, wheel, block, dimension chain, log chain, lumber chain, rafting dogs, car brake chain, railroad switch chain, special steel loading chain, wagon chain, repair links, lap links and rings, traces, butt chain, stage traces, lumber heel chain, breast chain, well chain, cart back chain, cow ties, breeching chain, hobble chain, tug chain, hame clips, breeching bolts, joining, connecting and anchor shackles, bar iron and steel and 12 and 16 pound T rails. The productive capacity is 25,000 tons chain iron, bar iron and steel at their Columbus Rolling Mill and 24,000 tons of chain.

The executive officers and managers of the plants are as follows:

John C. Schmidt, president.
A. S. White, vice-president.
J. T. Davis, general manager.
Robert Garland, secretary and general sales agent.
Robert Rigney, treasurer.
Wm. Robertson, assistant treasurer.
F. D. Mitchell, auditor.

Municipal Contracts and the Eight-Hour Day.

While the franchise for the extension of the Pennsylvania Railroad across New York City has again been approved by the Rapid Transit Commission, it has not yet been passed by the Board of Aldermen. The following letter from J. Edward Swanstrom, Borough President of Brooklyn, to William H. Farley, secretary of the United Board of Building Trades of New York (a body composed of 35 unions and representing 75,000 mechanics) is interesting, as showing the relation between public contracts and the contractor and his employees. Mr. Farley requested Mr. Swanstrom to vote and use his influence against the franchise unless a clause was inserted providing for the payment of the prevailing rate of wages and an eight-hour clause to govern the time for work. The reply follows:

I find myself unable to comply with your request.

1. Because I believe that the insertion of such a clause in the franchise would be unconstitutional in that it would restrict the free right of contract between employer and employee. The best legal minds agree that a clause of the character you specify cannot legally be made a condition of a grant of franchise, and I believe, therefore, that if I were to vote for such a provision my action in the premises would be mere demagogy.

2. Because I am profoundly impressed with the conviction that the enactment of such a clause would be prejudicial to the best interests of workingmen, for the reason that it would result in the abandonment of an enterprise of great public importance and of the highest value to the city of New York. The Pennsylvania Railroad company, if they secure the proposed franchise, will spend approximately the sum of $50,000,000 in constructing tunnels, terminal stations, &c. The benefit of this stupendous work will accrue to labor, a large part of the expenditure necessarily finding its way into the pockets of the workingmen. The insertion of the provision would operate to discourage capital from entering upon enterprises of a similar character. Labor can be depended upon to take care of itself, as it always has shown itself abundantly able to do.

3. Because I believe that were I to comply with your request it would be against the best interests of my constituents, including thousands of workingmen in this borough. To reject this proposed great work would not only be a public calamity, but would inflict an irreparable wrong upon labor and its allied interests.

The Ohio Bankers' Association, in convention at Cincinnati on the 16th inst., adopted resolutions favoring the repeal of the national bankruptcy law as an instrument "which has served its purpose, and its life on the statute books is now more harmful than beneficial to the business interests of the country." It was recommended that a committee be appointed at the meeting of the American Bankers' Association in New Orleans next month to outline such amendments to the national banking laws as "will make them more flexible and more responsive to the requirements of the commercial and industrial demands of the country."

OBITUARY.

MAURICE NUNAN.

Maurice Nunan, aged 41 years, died at Liberty, N. Y., whither he had gone to recruit his health, October 5. Mr. Nunan was in the employ of the Livingston Nail Company from the time he was 13 years old until he was incapacitated for business some time ago. He covered a territory reaching from the Atlantic coast to the Missouri River, and made many friends by his native wit, bright, aggressive personality and tactful manner, acquiring a reputation as a successful salesman in the horse nail trade.

WALTER CRANE.

Walter Crane, librarian of Carnegie Library at Braddock, Pa., died October 19 of apoplexy, aged 45. He was born in Roshire, Scotland, and came to this country when six years of age. Fourteen years ago he located in Joliet, Ill., where he managed the combination club house for workingmen erected by the then Joliet Steel Company, now part of the Illinois Steel Company. His work in that capacity was eminently successful, making him conspicuous in the movement for the betterment of the conditions surrounding workingmen. It was while there that Andrew Carnegie heard of his work and brought him to Braddock, where he has had charge of the library since that time.

NOTES.

ROBERT C. SCHENCK, president of the Malleable Iron Company of Dayton, Ohio, died on October 15 in a hospital in Utica, N. Y., where he had been taken for treatment from his summer home in the Adirondacks. Mr. Schenck was also president of the First National Bank of Dayton.

Large Purchases of Ore Property.—PITTSBURGH, PA., October 22, 1902.—The Shenango Furnace Company of Pittsburgh, operating three blast furnaces at Sharpsville, Pa., have recently had deeds filed transferring to that company some large ore properties in the Mesaba and Marquette region. These properties were bought in August during the trip to the ore regions of Henry W. Oliver and W. P. Snyder, who control the Shenango Furnace Company. The mines bought are the Webt and Howe Kinnie in the Mesaba region. It is said these two mines have about 30,000,000 tons of ore in sight. The other property bought is the Antonine mine, in the Marquette region, which has about 15,000,000 tons of ore in sight. The ore from these mines will be largely used by the Clairton Steel Company and the Shenango Furnace Company, W. P. Snyder being president of both concerns.

Coke Property Purchased.—PITTSBURGH, PA., October 22, 1902.—Joshua W. Rhodes & Co., People's Savings Bank Building, Pittsburgh, have bought from the Penn Coke Company two coke properties in the Connellsville region. These are the Claire and Hester plants, each containing 50 ovens. The purchasers took possession of the properties on Monday, October 20, and are now operating them under the old charter of the Penn Coke Company. It is probable that the greater part of the output of these 100 coke ovens will be used by the blast furnaces of the Cherry Valley Iron Company, one at West Middlesex, Pa., and the other at Leetonia, Ohio, the Cherry Valley Iron Company being an identified interest of Joshua W. Rhodes & Co.

The Monessen Furnace Company.—The Monessen Furnace Company of Pittsburgh will apply for a charter of incorporation on November 3. The Monessen Furnace Company are an identified interest of the Pittsburgh Steel Company of Pittsburgh, with works at Monessen, Pa., the incorporators of the new concern being John Bindley, Wallace H. Rowe, Edwin Bindley, Emil Winter and Willis F. McCook. It is understood the Monessen Furnace Company propose to build one or more blast furnaces at Monessen and eventually a steel plant will also be built to furnish steel to the wire rod and wire mills of the Pittsburgh Steel Company at Monessen.

Freight Carrying by Electric Railroads.

The following note is taken from the presidential address of H. H. Vreeland at the Detroit convention of the American Street Railway Association. It is interesting as showing the growth of freight traffic by electric roads and their relation to the steam railroad:

I have already referred to the immense mileage of interurban electric railroads which has been built during the last few years, especially in the Middle West. Many of these roads are hauling freight and it is a matter of great importance, not only to these roads themselves, but to the cities and towns which they serve, that the facilities which they should enjoy as regards the interchange of freight with the steam railroads should be as free as those between the steam railroads themselves. The first point requisite to this end is to have convenient connections with the neighboring steam railroads, so that the freight cars can be passed from one to the other. The right of the electric company to demand this has only recently been decided in New York State in a case which was contested between the Hudson Valley Railway Company and the Boston & Maine Railroad Company, in which the Court of Appeals reversed the decision of the Appellate Division and rightly decided that an intersection and connection of the electric road and the steam road should be made in the interests of the local shippers. This right should be of great advantage to the electric railroad company, but the full benefit to the local shippers will not be derived until the full privileges of an interchange of freight cars between the two systems shall be as universally recognized as they now are between steam railroads, so that freight can originate on either the steam or electric road. Heretofore in many cases the steam railroad companies have shown an unwillingness to interchange freight with the competing electric roads, on the plea that the latter were not responsible in the same degree as the steam railroads, and by this means considerable freight transportation has been diverted from the electric railroad.

The Reduction of Transvaal Customs Duties.—Cablegrams dispatched from Pretoria on October 8 state that an ordinance appears in a *Gazette* extraordinary published on that day, making liberal concessions in the existing duties on goods entering the Transvaal Colony. The duties on machinery, building materials, metals and agricultural implements are to be entirely abolished, while the charges on numerous other articles will be materially reduced.

Rebecca Furnace of Kittanning Iron & Steel Mfg. Company, at Kittanning, Pa., is idle undergoing repairs. The stack is being relined, an additional engine and new boilers are being put in, and it is probable the furnace will be able to resume about December 1 next.

The Stanley Electric Mfg. Company, 29 Broadway, New York, have recently opened a sales office in Atlanta, Ga., to take care of the increasing demand for S. K. C. apparatus in the South. The office is in charge of George P. Hardy.

William H. Gibbons of Coatesville, Pa., formerly president of the Parkesburg Iron Company, has been elected president of the Eastern Steel Company of Pottsville, Pa.

For some time past a movement has been on foot to consolidate the leading forging plants in the United States.

The Lunkenheimer Company, Cincinnati, Ohio, have sent out invitations to the opening of their new works at Fairmont Saturday evening, October 25.

MANUFACTURING.

Iron and Steel.

The Youngstown Iron, Sheet & Tube Company, Youngstown, Ohio, are looking into the matter of purchasing coal lands in West Virginia, but as yet no deals have been closed. In case they decide to buy it is their intention to erect by-product coke ovens and make their own coke.

The McKeesport Tin Plate Company, Frick Building, Pittsburgh, now building a tin plate plant at Lynch Station, near McKeesport, Pa., have elected directors to serve until the annual meeting, which will be held in January next. These are as follows: E. P. Douglas, Theodore F. Nason, Philip Zenn, J. C. Smith, J. E. Lauck, John W. Fawcett, all of McKeesport; Edward R. Crawford of Duquesne, and William Curry of Pittsburgh. Previous to the meeting the stockholders inspected the new plant. It will have ten tin plate mills and when completed will be one of the largest independent tin mills in this country. The company expect to celebrate New Year's Day by making the first sheet of tin.

The American Bolt & Iron Company, Chicago, have been organized, George H. Taylor, Albert Martin, and Edgar E. Hubbard being the incorporators. The capital stock is $2500.

By November 1 it is expected that the new mill of the Ohio Falls Iron Company, New Albany, Ind., will be in operation. Nearly all the machinery is in position, and the big shears, weighing 110,000 pounds, have been in operation for some time, cutting up iron for use when the furnaces are fired.

The Sligo Rolling Mills of Phillips, Nimick & Co., on the South Side, Pittsburgh, are to be removed to Connellsville, Pa., the present site they occupy having been sold to the Panhandle Railroad. The plant was built originally in Pittsburgh in 1825, and the business has been carried on for many years under the name of Phillips, Nimick & Co., but has been solely owned by James M. Bailey. The mills have a capacity of about 40,000 tons a year of bars, channels, plates and specialties. The plant has 38 puddling furnaces, 12 heating furnaces, 2 hammers and 4 trains of rolls. A new company are being organized to operate the plant after it has been rebuilt at Connellsville.

The Sligo Iron & Steel Company, recently organized at Pittsburgh, with a nominal capital of $1000, will build a merchant bar mill at Mingo Junction, Ohio.

The Sharon Ore & Furnace Company of Sharon, Pa., will make application for a charter on October 31. It will be an identified interest of the Sharon Steel Company, and the officials of both concerns will be the same. The new company will take over the furnace and ore properties of the Sharon Steel Company.

The new basic open hearth steel plant being built by the Sharon Steel Hoop Company, at Sharon, Pa., will not be ready for operation before February next or later. They have been delayed a good deal in building this plant by reason of the scarcity of structural steel.

The Standard Gauge Steel Company, at Beaver Falls, Pa., will make some improvements and additions to their plant. Contracts have been placed for some new buildings.

The Republic Iron & Steel Company are endeavoring to purchase about 70 acres of land across the Mahoning River from their Struthers Works at Haselton, Ohio. In case the land is secured it will probably be used for the building of new works.

The Southern Car & Foundry Company, Birmingham, Ala., have blown in their charcoal furnace at Gadsden, and are now making first-class car wheel and malleable iron. They have also commenced the construction of a duplicate furnace. The two will give them a supply of 100 to 125 tons of charcoal iron per day.

The Andrews & Hitchcock Iron Company, Youngstown, Ohio, manufacturers of Hubbard Scotch foundry and Bessemer pig iron, are making some important improvements at their two furnaces at Hubbard, Ohio. Large blowing engines are being installed, a new engine house is being erected and new hot blast stoves are being added. The capacity of both stacks will be considerably increased.

The Toledo Stampings Company of Toledo, Ohio, have been incorporated with $300,000 capital stock by La Monte Bateman, I. N. Humphrey, Charles R. Clapp, C. R. Miller and others. I. N. Humphrey will be president and treasurer, and La Monte Bateman, secretary and general manager. The officers are stockholders of the Toledo Tube Company, which the company absorb. The company have secured a building site on the Terminal & Belt Railway whereon they will erect several buildings, the largest to be 100 x 400 feet. They will continue the manufacture of brazed tubing and in addition will manufacture shovels, scoops, skillits and other stamped articles, the sheet to be produced in their own sheet mill. They will install considerable new machinery.

The Marietta Sheet Steel & Tin Plate Company, East Norwood, Ohio, are rapidly completing their plant and are installing their new machinery. The Case Mfg. Company, Columbus, Ohio, are installing in the plant a large electric crane. It is expected the plant will be in operation within 60 days.

Work is progressing rapidly on the new plant of the Elyria Iron & Steel Works, Elyria, Ohio, a new concern headed by W. E. Miller, formerly president of the Shelby Steel Tube Company, who will manufacture agricultural tubing and small angles. Eugene Gage, formerly with the American Weldless Tube Company, Toledo, Ohio, will have charge of the sales of the new company.

General Machinery.

A permanent organization of the Standard Engineering Company, recently incorporated at Pittsburgh, was effected last week. Temporary offices have been established in the Frick Building in that city. Officers have been elected as follows: C. E. Wade, president; J. M. Shaw, secretary, both of Pittsburgh, and C. D. Cobau, treasurer, of Ellwood City. The works and business of the Ellwood City Gas Engine Company of Ellwood City and the National Tool & Machine Company of Pittsburgh have been bought and the equipments will be moved to the proposed new plant at Ellwood City. The company have three acres of ground and are completing plans for a large machine shop, which they expect to have ready for operation by the first of the year. They will manufacture gas engines, special machinery and dies. The capital stock has been made $200,000.

The foundation has just been laid for an addition to the plant of the Marine Iron Works, Bay City, Mich. The building will be constructed of brick, 50 x 96 feet, and two stories high. The growth in the company's business has made necessary this additional room.

A 15 horse-power electric motor, 50 feet of 2-inch line shafting, hangers, pulleys, elevator, emery grinder, drill press and other tools, complete list of which is not yet available, are required by the Alexander Furnace & Mfg. Company, Lansing, Mich., for their new two-story building, 72 x 80 feet, contract for erection of which has just been let.

The Best Mfg. Company, San Leandro, Cal., manufacturers of agricultural machinery, have built an addition to their plant, 150 x 200 feet, enlarged the erecting department for their combined harvesting machinery and contemplate increasing their force of men in order to take care of their increasing business.

J. B. Williams, Dublin, Ga., advises us that the Dublin Machine Shop & Wagon Company, which he, J. F. Muchison and H. T. Jordan have just organized, are in the market for about $10,000 worth of new machinery, including a 60 horse-power engine and a 70 horse-power boiler. The company will be incorporated with a paid in capital of $15,000, which will probably be increased to $50,000, and will erect a plant on a site recently purchased, with a capacity of about 10 wagons per day. They will also manufacture farm implements and do general machine work.

The Dover Machine Works & Foundry, E. L. Jones & Co., proprietors, Dover, Del., have put on the market in connection with their basket making machinery a new machine for cutting out bottoms for baskets. They have recently taken a contract from A. H. Baumart and Philip H. Lenderking to manufacture 12,000 hydrocarbon oil burners, a device patented last June.

The Modern Tool Company, Erie, Pa., manufacturers of self opening and adjustable screw cutting die heads, adjustable solid dies, tap and die holders and Wallace die grinders, will shortly move into new quarters, where they will have greatly increased facilities for the manufacture of their specialties. They have leased two floors in the Fourth Street Market Building, 52 x 160 feet, with a floor space of over 16,000 square feet, which they will equip with new and improved machinery, mostly purchased from the Pratt & Whitney Company and the Brown & Sharpe Mfg. Company. Power will be furnished by a 50 horse-power gas engine. The officers are C. N. Payne, president; F. L. Gallagher, treasurer, and George E. Shafer, superintendent.

The Minnesota Iron Company contemplate the erection of a machine shop at Hibbing, Minn., to be constructed of steel, 55 x 215 feet, and two stories high. The shop will be provided with an immense crane capable of handling one of the largest makes of steam shovels. The equipment will be of such character as to make possible the repairing of mining machinery on short notice.

The National Machinery Company, Tiffin, Ohio, manufacturers of bolt, nut and wire nail machinery, have just purchased 5 acres of land adjoining their plant in anticipation of extensive improvements, which will soon become necessary on account of their ever increasing domestic and foreign business.

The incorporation of the Ballard Iron Works, Seattle, Wash., is reported. Those interested are J. S. Darvill, Ed. Hopkins, C. House and W. Darvill. The new enterprise will consist of a foundry and machine shop, and will be run in connection with the Hopkins Boiler Works.

The statement that the Standard Underground Cable Company of Pittsburgh are building a new machine shop is untrue. However, they are adding two stories to one of their buildings and one story to another at their plant on the corner of Sixteenth and Pike streets. The contract has already been placed for these additions and also for the new machinery which is to be installed.

The Lloyd Mfg. Company of Allegheny, Pa., builders of coal mining machinery, have decided to increase their capital stock from $150,000 to $300,000. The present works are too small

to meet the demands of their growing business, and it is probable they will erect new and larger works at some other location.

The Detroit Southern Railroad Company are making plans to erect important locomotive repair shops at Napoleon, Ohio. Surveys are being made for the yards and buildings.

Though the Standard Machinery Company of Mystic, Conn., have greatly increased their facilities, they are running full force and overtime to fill their orders for paper cutters and bookbinders' machinery and iron castings.

The Susquehanna Castings Company, Wrightsville, Pa., are in the market for a nickel plating outfit and the necessary grinding and polishing machinery. (*See Foundries.*)

The building of the new plant of the Battle Creek Iron Works Company, Battle Creek, Mich., is progressing rapidly and the machinery is being placed. John J. Lumm, who for many years has been purchasing agent of the Advance Thresher Company, has resigned that position to accept the management of the Battle Creek Company.

The Salem Iron Works, Salem, N. C., have lately installed several new lathes, a planer, drill press and bolt cutter, and will shortly make other additions to their equipment. They are at present excavating for a three-story brick building 40 x 100 feet, which will be for the manufacture of saw mills and will also provide pattern shop and drafting room. When it is finished the old building will be used entirely for iron working machinery. The company have contracts that will keep them running full on their various lines for some time to come.

N. A. Christensen, 1212-1217 Herman Building, Milwaukee, Wis., has sent a notice to the trade stating that the Christensen Engineering Company, with whom he has been connected since their organization and is still engaged as cousulting engineer, will hereafter manufacture his air compressors connected with air brakes, exclusively. This places under Mr. Christensen's control the manufacture of air compressors for all other purposes. These will be manufactured for him by the Christensen Engineering Company.

The Snyder-Hughes Pump Company, Cleveland, who recently sold their factory buildings to the Cleveland Stampings & Tool Company, have purchased four acres of land on Sheridan street on the Cleveland & Pittsburgh Railway, and will erect a large plant. Ground has been broken for the machine shop, which will be 80 x 200 feet, and which is to be completed within two months. The office building will be 40 x 50 feet; the power house, 30 x 60 feet; pattern shop, 50 x 100 feet, and the foundry 60 x 120 feet; the latter will not be built until next spring. They will purchase considerable new equipment.

The Cleveland Machine & Mfg. Company of Cleveland, manufacturers of rolling mill machinery, punches, &c., will enlarge their plant. They are installing a new 3000-pound steam hammer and a 125 horse-power boiler.

The Marion Machine & Tool Company, who have removed from Marion, Ind., to Upper Sandusky, Ohio, are completing their new factory, which includes machine shop, 80 x 160 feet; foundry, 60 x 120 feet; engine and boiler house, 20 x 30 feet, and warehouse, 40 x 60 feet. They will manufacture steam pumps. Officers are L. C. Call, president; R. J. Main, secretary, and J. M. Main, treasurer.

The Arithmetical Scale Company, Cincinnati Investment Company's Building, Chattanooga, Tenn., recently incorporated with a capital stock of $100,000, advise us that they will be ready to purchase the machinery for their plant about November 1. They have secured quarters which they will equip for the manufacture of patented light and heavy draft computing scales, and arithmetical machines. The officers are: President, W. T. Adams of the W. T. Adams Machine Company, Corinth, Miss.; vice-president, A. J. McCord, and secretary and treasurer, J. F. McGregor, both of the McGregor & McCord Mfg. Company of Chattanooga. H. F. Kinser is superintendent.

The Raleigh Iron Works Company, Raleigh, N. C., recently incorporated with a capital stock of $50,000, for the manufacture of engines, boilers and general machinery, have purchased the works formerly occupied by the Allan & Cram Machine Company. T. L. Eberhardt is president and William T. Harding secretary.

The Ohio Motor Works, Sandusky, Ohio, have completed their new addition, which will be used as a machine shop, and are installing a number of new machine tools.

William Jones, Toledo, will establish a machine shop in that city in the warehouse corner Lynn and Water streets, formerly occupied by the Toledo Electric Light Company.

Boilers, Engines, &c.

Gaar, Scott & Co., Richmond, Ind., manufacturers of threshing machines, have begun the erection of a $50,000 structure for the building of engines.

The American Gas Engine Company of Sheboygan Falls, Wis., recently incorporated with a capital stock of $50,000, have leased the A. M. Duncan foundry in that city and will begin the manufacture of engines in a very short time. The officers of the company are F. M. Porter, president; E. Jenkins, vice-president; J. N. Russell, secretary and treasurer. Mr. Duncan retains a financial interest in the company.

The Clark Engine & Boiler Company, Kalamazoo, Mich., are contemplating erecting a substantial addition to their plant.

The Dublin Machine Shop & Wagon Company, Dublin, Ga., are in the market for a 60 horse-power engine and a 70 horse-power boiler. Address J. B. Williams. (*See General Machinery.*)

Plans and specifications are about ready and bids will shortly be asked for equipment for a new reservoir, pumping station, &c., for Lansing, Iowa. Geo. Cadogan Morgan, Royal Insurance Building, Chicago, is engineer. F. J. Spinner is chairman of commission, and N. A. Nelson, City Clerk.

The Pennsylvania Railroad Company placed another order last week with the Baldwin Locomotive Works of Philadelphia for 150 locomotives, to be built during the coming year, in addition to the 200 ordered a month ago. They are also building at their own shops at Altoona, Pa., between 175 and 200 locomotives. To accomplish this, orders have been given to carry on work at these shops night and day. About 13 locomotives are being turned out each month at the Altoona shops, but with the installation of more machinery, which is now under way, this output will be materially increased.

The Ricard Boiler Works Company of Toledo, Ohio, have purchased the factory at Cherry and Vine streets, that city, formerly occupied by the Meilink Bicycle Company, and will remodel the buildings and erect additions for their works. An adjoining building will be used for the manufacture of dynamos, elevators and general machinery. J. N. Ricard is at the head of the company.

Cincinnati capitalists have bought up the electric light plant and the street railway at Zanesville, Ohio, and have combined the two under the name of the Zanesville Railway, Light & Power Company. The company will be capitalized at $1,000,000 and the power plant will be greatly improved and enlarged and new machinery installed

The Electrical Equipment Company, Monadnock Building, Chicago, have been awarded a contract for the complete installation of a lighting plant for the city of Washington, Iowa. The equipment includes a Westinghouse three-phase, 60-cycle generator direct connected to an Ideal engine. Work is now under way and the plant will be in operation about January 1, 1903. The same company have also been awarded a contract for the complete installation of a water power electric transmission plant for the Rouge River Light & Power Company, at Rockford, Mich. The equipment includes two General Electric generators and various motors ranging in size from 10 to 50 horse-power. The plant will be in operation December 1.

Foundries.

The Globe Iron Works, Stockton, Cal., advise us that the demand for their Truax automatic ore cars has greatly increased during the past year, having sold more of those cars in the first six months of 1902 than in the whole of the previous year. The company have just completed a new iron foundry, 60 x 100 feet, which is equipped with two Whiting cupolas, Root blower and engine and an 8-ton Craig Ridgway & Son steam hydraulic crane.

The Grafton Foundry & Machine Company are erecting a gray iron foundry at Grafton, W. Va., with a capacity of 5 tons daily.

The Sharon Foundry Company, recently organized at Sharon, Pa., will soon commence work on the building of a new foundry at Wheatland, Pa., and expect to have it in operation early next year. The contract for the steel structural work has been given to the Riter-Conley Mfg. Company of Pittsburgh. There will be a main building and several small buildings. The company will manufacture heavy steel castings and ingot molds.

The court has authorized the receiver of the Coxey Steel Casting Company, Mt. Vernon, Ohio, to issue receiver's certificates in the sum of $30,000 for the purpose of completing the furnishing of the new plant.

The Michigan Steel Casting Company, Detroit, Mich., have filed articles of incorporation. The capital stock is $300,000, of which $30,000 is paid in. The stockholders are Karl R. Davies, Fred. J. McMurtrie, Maxton R. Davies.

The Mathews Steel Casting Company, Marion, Ind., will be ready for operation within six weeks. The factory will start with a force of 150 men.

The Martin-Anderson Company, Omaha, Neb., are building an addition to their plant. The new structure now under way is to be 40 x 60 feet and will be used as a foundry, machine shop and storehouse. Machinery costing $8000 will be installed.

The Berlin Machine Works, Beloit, Wis., have purchased land adjoining their shops from F. F. Martin of that city, on which an extension to their new foundry building will be built.

The Morris & Lewis Company, Moline, Ill., will erect a foundry plant this fall. The plant will comprise a main building to be the machine department, 80 x 300 feet, two stories high; molding department, 40 x 100 feet; grinding room, and office. The total cost of the plant will be $30,000.

The Ground Hog Plow & Foundry Company, Clarksville, Tenn., have incorporated with a capital stock of $50,000 to manufacture and repair plows and all other kinds of machinery made of iron or wood and also do a general foundry business.

The promoters of the new company are J. R. Rossiter, W. M. Drane, Jr., B. W. Mucrae, Matt Tracey and H. C. Merritt.

Meadville Malleable Iron Company, Meadville, Pa., are increasing their capital $50,000, and expect to begin work on additions to the plant early next year, intending to double the capacity. No additional machinery will be required, as power plant and other machinery sufficient for the additional output was installed with the original plant.

Operations will soon be resumed at the Two Rivers Iron Works, Two Rivers, Wis. Orders from local manufacturers are ample to keep the foundry in active operation.

The Piedmont Foundry & Machine Company, Hickory, N. C., organized last June, have erected a shop 50 x 150 feet for general foundry and machine work. They will make a specialty of cotton mill machinery castings. The officers are A. A. Shuford, president; J. H. P. Cilley, vice-president and general manager, and G. H. Cilley, secretary and treasurer.

The Susquehanna Castings Company, Wrightsville, Pa., have just completed a 30 x 110 foot addition to their plant, which will be used as a nickel plating and polishing department, and are in the market for a nickel plating outfit and the necessary grinding and polishing machinery. These parties have also recently finished an addition to their foundry, enabling the employment of fourteen additional molders and now contemplate a further addition.

The Claysville Foundry & Mfg. Company, recently organized, will erect a foundry and machine shop at Claysville, Pa. The contract for the building has been given to the Riverside Bridge Company of Wheeling, W. Va. The equipment for the new plant has also been contracted for and the new company expect to be in operation within three or four months. The incorporators are N. B. Brockman, H. H. Miller and J. W. Grimes.

Bridges and Buildings.

The Indiana Bridge Company, Muncie, Ind., are planning to rebuild their works some time during the coming year. A more desirable site than the one on which they are now located will be secured, where better railroad facilities are offered. Between $25,000 and $50,000 is to be expended in the construction of the new plant.

The American Bridge Company are pushing work as fast as possible on the new bridge works which they are building at Economy, Pa. The company own a large tract of ground at Economy and it is the intention to centralize their bridge operations at that point as much as possible. To carry this out they will probably remove the Walker Works from West Homestead to Economy.

The Pittsburgh Construction Company, Bissell Block, Pittsburgh, have received a contract for the erection of a steel bridge over the Monongahela River for the Pennsylvania Railroad. About 6000 tons of steel will be required and the contract is as follows: Remove existing single track bridge and erect a new double track railroad bridge, the 400-foot span being the heaviest of its length ever built. The channel span will be about 400 feet in length, and there will be five plate girder spans each 75 feet, or a total of 375 feet, and five deck lattice spans each 140 feet, or a total of 700 feet. The hight of the channel span above low water will be about 70 feet, and under the terms of the contract the Pittsburgh Construction Company are to care for traffic on temporary false work while some of the masonry is being rebuilt.

The Standard Engineering Company, recently organized in Pittsburgh, whose plant will be located at Ellwood City, Pa., have given a contract to the McClintic-Marshall Construction Company of Rankin for a steel building 50 x 220 feet, with a leanto. The building will be commanded by a 25-ton electric traveling crane. The McClintic-Marshall Construction Company have also received a contract from the Tarentum Passenger Railway Company for a steel viaduct 360 feet long. The same concern have received a contract from the Pittsburgh & Washington Railway Company for three steel viaducts, in which will be used about 900 tons of steel.

The Penn Bridge Company of Beaver Falls, Pa., have received a contract for the structural steel work for the Government Building at Louisiana Purchase Exposition, at St. Louis, the contract price being $120,570.

The Fort Pitt Bridge Works have completed the extensive additions to their plant at Canonsburg, Pa., and have booked considerable tonnage for the coming year. Among their recent orders are the rod mill for the Standard Underground Cable Company, the open hearth plant of the C. Pardee Works at Perth Amboy, the compound building for the General Electric Company at Schenectady and the buildings for the Commonwealth Steel Company of St. Louis.

Fires.

Fire destroyed the Lakeside Iron Works at Muskegon, Mich., on the morning of October 9, causing a loss of between $12,000 and $15,000; insurance, $5500. Included in the loss were a large amount of finished work ready for shipment, patterns, tools and machinery. This same company have suffered losses by fire several times, having just finished rebuilding after a fire last year.

The plant of the American Glue Company at Springdale, near Pittsburgh, was destroyed by fire October 20. The loss will be about $120,000.

The machine shops of the Collins Bay Rafting & Forwarding Company, Collins Bay, Ont., were destroyed by fire last week. The loss is about $50,000.

The Republic Iron & Steel Company recently suffered a $10,000 loss by fire at their rolling mill at Birmingham.

The chocolate factory of Atkinson & Co., 44-48 Spencer street, Brooklyn, N. Y., was destroyed by fire October 20. The loss is about $75,000.

The Tucker Wood Rim Works, Urbana, Ohio, were destroyed by fire October 18, entailing a loss of about $50,000.

G. W. Hamblett's machine shop in Lawrence, Mass., was destroyed by fire last week, causing a loss of about $25,000.

Hardware.

The Fayetteville Wooden Ware Company, Fayetteville, N. C., were established in 1890 for the manufacture of white cedar ware, embracing domestic and horse pails, field and covered water cans, churns and tubs. They also make pails and buckets in oak. Territory covered is from New York to Texas, business now being all that could be desired, J. W. Hollingsworth is president of the company, and R. D. Jones treasurer and general manager.

The newly patented combination wrench which has been manufactured and sold during the past four months by the A. Dudly Mfg. Company, Menominee, Mich., has commanded a good sale, over 20,000 of the tools having been placed on the market during that time. Foreign as well as domestic orders have been included in the trade, one order having been booked for Hamburg, Germany.

The Eames Pulley Company have located at Three Rivers, Mich., where they expect soon to begin the manufacture of pulleys. The company have rented a building, adding to it additional floor space, and are installing new machinery. The company expect to manufacture 50 pulleys a day.

The Barnes Mfg. Company, manufacturers of pumps, Mansfield, Ohio, owing to the large increase in their business, have found it necessary to add a new 150 horse-power water tube boiler to their present plant. They are building a new casting storage house, as well as a new blacksmith shop. They have also added quite a number of new machines and increased their output in all directions.

C. O. Jelliff & Co., Southport, Conn., have incorporated their business under the style of the C. O. Jelliff Mfg. Company, who will continue the manufacture of wire goods, principally brass and copper wire cloth. In addition to their present plant the company are erecting a factory 90 x 32 feet, two stories and basement.

The W. H. Sweeney Mfg. Company, Brooklyn, N. Y., manufacturers of tin, brass, copper and nickel plated ware, and who make stove boards as a side issue, advise us that they have manufactured 50 per cent. more boards than last year, and have already sold as many as for the entire season of 1901.

Beall Bros., Alton, Ill., are enjoying a good trade in their shovel department, receiving all the orders they can possibly attend to. The addition to their shovel factory for the manufacture of Antrim or plain back goods is now in operation, and they are shipping the product as fast as it is turned out.

The Truss & Cable Fence Company, Youngstown, Ohio, have recently made large shipments of their fence to Bombay, India, and Puerto Cortez, Honduras, Central America.

The Chapin-Stephens Company, Pine Meadow, Conn., are replacing one of their water wheels with a new Hunt wheel and are making some other improvements of a like nature. Since the consolidation the general finish and appearance of their line has been improved and the output largely increased. The company will be in a position to turn out their products in large quantities as soon as they get running again, which will be in a week or two.

Raymond Mfg. Company, Corry, Pa., have had the busiest summer in their history, and have a large number of orders booked for winter delivery. They are especially busy on wire springs, of which they make large quantities not only for this country but for Canada, with whom they have a good trade, Europe, South Africa and South America.

Miscellaneous.

The Pittsburgh Light & Mfg. Company of Pittsburgh have applied for a charter and will manufacture gas lamps.

The National Car Coupler factory, Converse, Ind., has resumed operations after one of several shut downs caused by the shortage of pig iron. The company have had to rely largely upon foreign iron.

Although the West Bay City Shipbuilding Company, West Bay City, Mich., have been and are still experiencing much difficulty in obtaining material, a small force of men have begun the season's work by bending frame work, such as angle iron, &c. The delay in obtaining material has given the company an opportunity to overhaul the yards and to repair and rebuild some of the machinery.

Orders were placed last week by the Wabash Railroad for

1000 steel freight cars, destined for service on the Pittsburgh extension. The cars will be made by the American Car & Foundry Company, and will be delivered about July 1, at which time the Wabash expect to be operating trains out of Pittsburgh. The new cars are of a special design, prepared by President Joseph Ramsey, Jr., and constructed principally for shipments of steel and iron products. It is also announced that orders have been given for 25 locomotives destined to do service on the Pittsburgh line.

The incorporation of a new company, known as the Elkhart Frog & Crossing Works, at Elkhart, Ind., with a capital stock of $30,000, is announced. The company will begin the erection of a factory within a few days. The building will be of brick, 40 feet wide and 160 feet long.

The Terre Haute branch of the American Car & Foundry Company has within the past few weeks shipped 189 of an order for 200 stock cars for Chicago, Rock Island & Pacific Railroad, delivering them at the rate of about 10 or 12 a day. The Vandalia Railroad recently placed an order with the company for 170 coal cars. A full force of men is kept busy night as well as day, although there has been considerable delay in the building of cars due to the inability of the company to secure malleable iron castings, axles, &c.

A company have been organized at Louisville, Ky., to lease from the Louisville & Nashville Railroad the Harrod's Creek & Westport Railroad, the intention being to equip the road with electricity. The officers are Lafan Allen, president; Owen Tyler, first vice-president; Bethel Veach, second vice-president, and W. N. Cox, president of the Louisville Public Warehouse Company, secretary and treasurer. These, with W. F. Booker, Henry A. Bell and E. T. Halsey, comprise the Board of Directors.

The Peckham Mfg. Company, 244-246 South street, Newark, N. J., are now occupying their new factory, 40 x 125 feet, and their facilities for the manufacture of polishing meal and polishing leather have been quadrupled.

The Star Corundum Wheel Company, Detroit, Mich., whose corporate existence was recently dissolved by the sale of their property and franchises, have been succeeded by the Star Corundum Wheel Company, Limited, and the offices and factory of the company have been removed from Twenty-first and Standish streets to 224-258 Twenty-first street, where their capacity has been greatly increased, having doubled the floor space and added new equipment. John R. Kempf, manager of the old company, will continue in a similar capacity in the new company. The capital of the company has been increased, thereby enabling them to carry a larger stock than heretofore in order to take care of their customers' requirements promptly. The officers are Reuben Kempf, chairman; John R. Kempf, secretary and treasurer, and W. H. Vance, superintendent.

The Williams Mfg. Company, Northampton, Mass., manufacturers of baskets, are building a $12,000 addition to their plant.

Some Pittsburgh capitalists, headed by Thomas Kerr, are making efforts to secure control of the works of the Youngstown Car Mfg. Company, at Youngstown, Ohio, which have been idle for some months. In case these parties secure control of this plant, it is the intention to put it in first-class shape and start it up as soon as possible in the manufacture of wooden cars.

The plant of the Wight Mfg. Company, Chattanooga, Tenn., has been enlarged and now has a capacity nearly four times as large as formerly. The company manufacture and sell patent springs. E. M. Wight, president; W. B. Wight, vice-president; A. E. Hudson, secretary, and F. Steffner, manager, are the officers.

The Beaver Valley Metal Company will erect a plant at New Brighton, Pa., for the manufacture of bars and bronze castings. The incorporators are J. H. Barton, George Hildebrand and W. D. Berry. Temporary offices have been opened in Room 732 Frick Building, Pittsburgh.

The Belmont Stamping & Enameling Company, recently organized, may locate an enameled ware plant at Bellaire, Ohio. A definite decision regarding location will likely be made this week. John Troll is president and U. F. Fletcher is secretary.

The Keystone Coal & Coke Company of Greensburg, Pa., have contracted with William B. Scaife & Sons Company of Pittsburgh, Pa., for a large filtering plant for their water works at Madison, Pa. Among some of the other recent contracts taken for the Scaife and We-Fu-Go water filtering systems are the following: Union Steel Company, Pittsburgh, 500,000-gallon plant; Lancaster Mills, Clinton, Mass., and W. D. Boyce Paper Company, Marcellus, Ill., 1,000,000-gallon plant each; Thomas Phillips Company, Akron, Ohio, 750,000-gallon plant; Gibson Mfg. Company, Concord, N. C., 125,000-gallon plant; Carroll Hotel, Vicksburg, Miss., complete filtering system, and others.

The American Emery Wheel Works, Providence, R. I., have just completed a one-story brick addition to their plant, 40 x 65 feet. The new part contains a kiln and is also used as a store room. The addition, we are advised, will enable them to fill orders for their vitrified wheels more promptly. This firm do a large foreign business and among their latest shipments was a large order for Egypt.

The United States Mill Supply Company, Providence, R. I., have recently organized with the following officers: William J. Rook, president; George Kollstede, treasurer; F. T. Rook, secretary. An office and warerooms have been opened at 32-36 South Water street, and we are advised that they are carrying a complete line of mill supplies. The Messrs. Rook were formerly with the Brown Bros. Company.

The Ohio Automobile Company, Warren, Ohio, have given up the idea of removing their plant to Detroit, which was talked of when prominent Detroit people became interested, and they will make important improvements to the plant at Warren.

There has been a hitch in the negotiations by the Peerless Automobile Mfg. Company of Cleveland for the purchase of the old brass works at Lorain, Ohio, and the Lorain syndicate have opened negotiations with other parties. The Cleveland people planned to buy the plant and increase the scope of the company, Lorain people to subscribe to the new stock.

A company have been organized at Duluth, Minn., to control the patents of the automatic railway switch invented by A. G. Lawrence. The company will be known as the Lawrence Switch Company and will have the following officers: President, W. A. McGonagle; vice-president, T. W. Hugo; secretary, W. E. Lawrence; treasurer, John F. McCarthy, who with A. G. Lawrence, H. S. Mahon and H. H. McNamara will constitute the board of directors.

The Craig Shipbuilding Company of Toledo, Ohio, have closed contracts for two more large steel vessels. One of the boats will be a passenger and freight steamer for the Dunkley-Williams Company, Chicago. She will be christened the "City of South Haven," and will have 240 feet keel, 40 feet beam, with triple expansion engines and Scotch boilers; to be capable of a speed of 20 miles an hour. The other boat will be a large car ferry for the Grand Trunk Car Ferry Line, to operate on Lake Michigan. She will be one of the largest on the Great Lakes and will be the first of a number for the same company.

The Pressed Steel Car Company of Pittsburgh will erect a very large office building at their McKee's Rocks plant in that city. It will cost about $50,000 and will contain upwards of 30 rooms. On the first floor will be located the purchasing department, freight agent's quarters and five other offices. On the second floor rooms are provided for the mechanical engineers, chief clerk, assistant to the general manager, chief engineer, general superintendent, clerks, estimating department and bath. The largest room on the third floor will be for draftsmen, 51 x 72 feet. Next to it comes the chief draftsman's office, 22 x 25 feet; also a blue print room, order department and large vault. The general dining room, 22½ x 53 feet; also a private dining room, 22 x 30 feet, likewise a kitchen, butler's pantry, chemist's laboratory, ladies' and servants' toilet rooms and three servants' bedrooms, will be on the fourth floor. The structure will be one of the largest and most complete private office buildings in the country.

Reduction in Iron Boiler Tubes.

(*By Telephone.*)

PITTSBURGH, PA., October 22, 1902.—The National Tube Company, Pittsburgh, Pa., have sent out notices to the trade of a material reduction in prices of iron boiler tubes. The new discounts are as follows:

1 to 1½ inches and 6 to 13 inches	36½ %
2¾ to 5 inches	45½ %
1¼ to 2½ inches	35½ %

It is probable that the competition of outside mills will force the National Tube Company to make lower prices on butt weld pipe from ½ inch to 4 inches.

The annual meeting of the Board of Directors of the Crucible Steel Company of America was held in the Frick Building, Pittsburgh, on Monday, October 20, at which officers were elected for the ensuing year as follows: Reuben Miller, president; Frank B. Smith, general manager and assistant to president; Benjamin Atha, first vice-president; Robert E. Jennings, second vice-president; James H. Park, third vice-president; Charles E. Clapp, fourth vice-president; Alexander Thomas, secretary, and Julius Bieler, treasurer. The following Executive Committee was also elected: Reuben Miller, chairman; Frank B. Smith, secretary; Benjamin Atha, Robert E. Jennings, W. P. Snyder, James H. Park, A. W. Mellon.

Anderson, Ind., tin workers, voting for the fourth time on the proposition, almost unanimously decided to accept a temporary 25 per cent. cut in wages to enable the American Tin Plate Company to open and keep their mills in operation. The members of the Elwood, Ind., lodge voted to accept the cut on the Standard Oil Company's contract but not on others.

The Iron and Metal Trades.

Hopes of consumers of Pig Iron that there would be a more plentiful supply of metal now that the Anthracite Coal strike is over may be doomed to some disappointment. The actual tonnage of Iron made with Anthracite is comparatively small, and it may be some time before the furnaces themselves are assured of a sufficient and regular supply to resume. Quite a number of stacks in the Lehigh and Schuylkill valleys and in New Jersey use Coke exclusively and others take a heavy proportion. The resumption of mining will release some Furnace and Foundry Coke and will thus do some good, but the real crux of the fuel situation lies in the trouble in the supply of Coke, which has developed such extraordinary movements like the shipment of Colorado Coke into the Chicago district.

So far as the future is concerned the furnacemen of the Central West are facing with increasing dread the possibilities of railroad blockades during the winter months, and there is little hope that steady Pig Iron production near the maximum can be realized until the spring. Consumption, of course, usually falls off in the winter months, but the chances are that in spite of this we shall keep short and shall have to depend upon importations quite largely. In fact, the report is current that there has just been purchased for delivery at Baltimore a block of 25,000 tons of foreign Bessemer Pig Iron.

The outlook for further importations of Steel is not favorable. Many of the mills who used imported Steel will find it difficult to pay current prices even on a $6.72 duty and come out whole rolling Wire or Sheets at the present reduced market values.

While thus the situation in the cruder materials is very strong and promises to continue so, the tendency in many finished lines is downward. Quite recently Bars, both East and West, have displayed some weakness, while the lower prices on Wire, Sheets, Tin Plate and Pipe are seriously affecting smaller plants who do not control their own raw material. Their position is becoming a very difficult one in many cases. Of course, this does not mean that actual consumption has fallen off. The situation in this regard is difficult to gauge, first because consumers and dealers having received ample warning have reduced their stocks to a minimum, so that their present rate of purchases, which is generally pronounced heavy, does not accurately reflect consumption. The diversion of tonnage from the smaller mills to the larger interests is also apt to lead to somewhat misleading conclusions, if viewed from the side of the great producers. Reports of misery on the one hand and of abundance on the other must therefore be weighed with caution.

If it were safe to draw inferences from what is going on in the heavy branches, little doubt would be felt. It is true that deliveries are getting a little better in Structural Material, but in Steel Rails the pressure is very heavy and further purchases from foreign makers are announced. The Plate trade is congested. The sum total seems to be that there is work enough urgent in character to keep up the pressure upon the cruder products to the utmost.

In the Metal trade the advance in the price of Copper is creating some interest. There is no evidence as yet that the powerful interests who have resisted any advance have changed their position.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one month and one year previous.

	Oct. 22, 1902.	Oct. 15, 1902.	Sept. 24, 1902.	Oct. 23, 1901.
PIG IRON:				
Foundry Pig No. 2, Standard, Philadelphia	*$22.00	*$22.00	*$22.00	$15.00
Foundry Pig No. 2, Southern, Cincinnati	*22.25	*22.25	*22.25	13.75
Foundry Pig No. 2, Local, Chicago	*23.00	*23.00	*23.00	14.75
Bessemer Pig, Pittsburgh	*21.75	*21.75	*21.75	16.00
Gray Forge, Pittsburgh	*20.50	*20.50	*20.75	14.15
Lake Superior Charcoal, Chicago	*26.00	*26.00	*26.00	17.00
BILLETS, RAILS, ETC.:				
Steel Billets, Pittsburgh	29.50	31.00	†29.00	27.00
Steel Billets, Philadelphia	†**28.00**	†27.50	†27.00	28.00
Steel Billets, Chicago	Nom.	....	†29.50	....
Wire Rods, Pittsburgh	36.00	36.00	35.50	34.00
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00
OLD MATERIAL:				
O. Steel Rails, Chicago	19.00	19.00	19.00	14.00
O. Steel Rails, Philadelphia	21.50	21.50	21.50	17.50
O. Iron Rails, Chicago	25.00	25.00	25.00	21.00
O. Iron Rails, Philadelphia	*24.50*	25.00	25.00	20.00
O. Car Wheels, Chicago	Nom.	22.50	21.00	16.00
O. Car Wheels, Philadelphia	*19.00*	19.00	20.00	16.50
Heavy Steel Scrap, Chicago	18.50	18.50	18.50	13.50
FINISHED IRON AND STEEL:				
Refined Iron Bars, Philadelphia	1.92	1.92	1.92	1.65
Common Iron Bars, Chicago	1.80	1.80	1.85	1.70
Common Iron Bars, Pittsburgh	1.80	1.80	1.80	1.60
Steel Bars, Tidewater	*1.75*	1.80	2.00	1.62½
Steel Bars, Pittsburgh	1.60	1.60	1.60	1.60
Tank Plates, Tidewater	**2.10**	2.10	2.00	1.75
Tank Plates, Pittsburgh	**1.90**	1.90	1.75	1.60
Beams, Tidewater	2.10	2.15	Nom.	1.75
Beams, Pittsburgh	2.10	2.15	Nom.	1.60
Angles, Tidewater	2.10	2.15	Nom.	1.75
Angles, Pittsburgh	2.00	2.00	Nom.	1.60
Skelp, Grooved Iron, Pittsburgh	*1.97½*	2.00	2.02½	1.85
Skelp, Sheared Iron, Pittsburgh	2.10	2.10	2.10	1.90
Sheets, No. 27, Pittsburgh	*2.65*	2.65	2.85	3.05
Barb Wire, f.o.b., Pittsburgh	*2.50*	2.50	2.85	2.90
Wire Nails, f.o.b., Pittsburgh	*1.90*	1.90	2.00	2.30
Cut Nails, Mill	2.05	2.05	2.05	2.05
METALS:				
Copper, New York	**12.00**	11.70	11.60	16.85
Spelter, St. Louis	5.25	5.25	5.25	4.10
Lead, New York	4.10	4.10	4.10	4.37½
Lead, St. Louis	4.00	4.00	3.97½	4.25
Tin, New York	**26.25**	25.50	25.80	24.75
Antimony, Hallett, New York	7.75	7.75	7.75	8.50
Nickel, New York	40.00	40.00	40.00	60.00
Tin Plate, Domestic, Bessemer, 100 lbs., New York	4.19	4.19	4.19	4.19

* For 1903. † Foreign.

Chicago.

FISHER BUILDING, October 22, 1902.—(*By Telegraph.*)

Judging from the free offerings of foreign Iron made in this market from the East, the prospect of settlement of the Anthracite Coal miners' strike has converted many Eastern holders into more eager sellers, and reports have reached this market of much lower prices made on the Atlantic seaboard. The only impression made on the local market, however, has been to check the buying of both domestic and foreign brands in appreciable quantities beyond the sale of one or two cargoes of Scotch Iron, which had previously been under negotiation. Prices of Iron for immediate delivery or for prompt shipment have been well maintained at the previous level, buyers not only giving preference to but being willing to pay a premium for such Iron over the offerings for future delivery. Both Bar Iron and Soft Steel Bars have given indication of less firmness, with very little new business and difficulty in obtaining specifications on old contracts still the prominent features. The offerings by independent mills of Sheets, Pipe, Tubes, Bars and Shapes are making more impression on the market from week to week. Rails and Plates continue to be the strongest and most active spots in the Steel market. For Rails especially there is o continued active demand for both standard and second quality, both Heavy and Light Sections, with liberal sales of small amounts and some heavy tonnages still pending.

Pig Iron.—Liberal offerings of both foreign and domestic Iron have been made to local dealers and consumers in the East by mail and through personal representatives during the week, but as a rule these overtures have met with a cold reception. Most of the Iron which has been tendered is for delivery during the balance of this year, some of it

for quick shipment, but the prices asked have not been attractive to dealers, and consumers having largely contracted are not willing to purchase in the quantities necessary to obtain the lowest prices, their needs being dependent upon the deliveries or nondeliveries of furnaces. According to the best information obtainable the settlement of the Anthracite Coal miners' strike will not soon relieve the stringency in Coke. As it is to be the policy of the railroads to give their first attention to the distribution of Anthracite Coal to the general public, and with the transportation facilities already taxed to the utmost, it seems improbable that there will be soon any increased movement of Coke to either furnaces or foundries. There will be probably a gradual return to a normal condition in the Bituminous Coal movement, and Coke ovens will receive a more ample share of Coking Coal, but if there is no increase in the facilities for moving the Coke the furnaces already idle will have little prospect of resuming operations in the near future. It is reported that 18 furnaces depending on Connellsville Coke are either banked or blown out. One local furnace, however, has blown in during the week, having been able to obtain a sufficient supply of Coke from Colorado and the open market to make up the deficiency caused by the nondeliveries on contracts. But while the prospect that domestic furnaces will be able to make better deliveries of Iron during the next month or so is without improvement, consumers have reason to believe that an ample supply of spot Iron will be available, and they therefore prefer to buy from hand to mouth rather than to enter into contracts for large quantities, even if it is necessary to pay higher prices now. There have been one or two cargoes of Scotch, English and German brands sold in this market during the week, however, prices ranging from $24 to $28, according to analysis, buyer and time of delivery. At the close No. 3 foreign Iron is offered at $22 to $23 in cargo lots, duty paid, Chicago, but in small quantities, ranging from carload to 100-ton lots, the same premiums as previously noted have been obtainable. There have been quite a number of sales of domestic Iron, mainly in carload lots, at $27 to $27.15 for No. 2 and $27.65 to $28 for No. 1, spot. There has been little call for domestic Iron for next year's delivery, but one lot of 500 tons of No. 2 Foundry has sold for delivery during the first six months of next year on the basis of $20 at the furnace, Birmingham. Several lots ranging from 1000 to 2000 tons of Standard Bessemer have been sold at $22.75 to $22.85, Valley furnace, for delivery during the next two months. It is reported that some of the Southern furnaces will have caught up on old orders in December, and will be prepared to take on new business for 1903. The following are the nominal prices for delivery during the first half of 1903:

Lake Superior Charcoal	$26.00 to $27.00
Local Coke Foundry, No. 1	23.50 to 24.00
Local Coke Foundry, No. 2	23.00 to 23.50
Local Coke Foundry, No. 3	22.50 to 23.00
Local Scotch, No. 1	24.00 to 24.50
Ohio Strong Softeners, No. 1	25.50 to 26.50
Southern Silvery, according to Silicon	24.10 to 24.50
Southern Coke, No. 1	24.15 to 24.65
Southern Coke, No. 2	23.65 to 24.15
Southern Coke, No. 3	23.15 to 23.65
Southern Coke, No. 1 Soft	24.15 to 24.65
Southern Coke, No. 2 Soft	23.65 to 24.15
Foundry Forge	22.15 to 22.65
Southern Gray Forge	21.65 to 22.15
Southern Mottled	21.65 to 22.15
Southern Charcoal Softeners, according to Silicon	27.15 to 27.65
Alabama and Georgia Car Wheel	27.00 to 27.50
Malleable Bessemer	24.00 to 25.00
Standard Bessemer	25.00 to 26.00
Jackson County and Kentucky Silvery, 6 to 8 per cent. Silicon	27.60 to 28.60

Bars.—The market for Bar Iron has shown no improvement in any respect. Specifications are still light, and more mills are reported to have suspended temporarily. All mills are hungry for orders, and with keen competition, notwithstanding the higher cost of raw material, the market is very slow and prices are not well maintained. Business as a rule is confined mainly to carload lots and prices continue to range from 1.80c. to 1.85c., Chicago, mill shipment. Soft Steel Bars also have been without animation, there being more offerings by outside interests, and in one or two instances even the 1.75c. basis has been shaded. Some little increase in specifications has been noted during the past few days both for Bars and Hoops, but new business is very light. The following are the prices current: Soft Steel Bars, 1.75c. to 1.85c.; Hoops, 2.15c. to 2.25c.; Angles, 1.85c. to 1.95c., base, mill shipment. The store trade has been light and prices have been without essential change. Bar Iron is selling at 2.15c., Soft Steel Bars at 2c. to 2.25c., Angles at 2.50c. and Hoops at 2.40c. to 2.50c. from store.

Structural Material.—Business during the month of October thus far has shown some little improvement over the orders booked during the corresponding period in September, but as a rule the volume of new business is confined to small orders from stock, mainly for various structures which are to be erected this fall in Chicago. In addition to the Hartford Building, which will require about 400 tons, a malting company for a like quantity and the Kelly-Maus Building, which will require about 500 tons, the business taken during the week will aggregate scarcely more than 1000 tons, mainly for large sizes for next year's delivery. Independent mills are rolling large quantities, and these mills coming into more active competition as the season advances, with the ability to make early shipments, considerable business in a small way is being booked. One lot of 250 tons was sold to-day for shipment within ten days on the basis of quotations. Small sizes are being offered most freely. Foreign business, temporarily at least, seems to be checked and prices are entirely nominal. For domestic Steel, mill shipment, prices are as follows: Beams, Channels and Zees, 15 inches and under, 1.75c. to 1.90c.; 18 inches and over, 1.85c. to 2c.; Angles, 1.75c. to 1.90c. rates; Tees, 1.80c. to 1.90c.; Universal Plates, 2c. to 2.25c. Local stocks have been replenished and prompter shipments are now being made. The following are the prices current: Beams and Channels at 2.50c. to 3c., Angles at 2.50c. to 3c. and Tees at 2.55c. to 3.50c., at local yards.

Plates.—Few large orders have been placed during the week, but the market continues strong, with a fair demand for moderate amounts. The following are the prices current, mill shipment: Tank Steel, ¾-inch and heavier, 1.75c. to 2c.; Flange, 1.85c. to 2.10c.; Marine, 1.95c. to 2.20c. There is a good demand for small quantities for immediate shipment from local yards, and the following are the prices obtained: Tank Steel, ¾-inch and heavier, 2.25c. to 2.50c.; Tank Steel, No. 8, 2.35c. to 2.55c.; Flange, 2.45c. to 2.65c., all f.o.b. warehouse, Chicago.

Sheets.—There has been a fair volume of business, and although competition is still keen, there seems to be less pressure, it now being difficult to obtain discounts on Galvanized under 75 and 10 on the base price for mill shipment. The jobbing demand has continued fair and readily supplied from local stocks. Prices are as follows: No. 20 Black Sheets sell at 2.60c. to 2.65c. and No. 27 at 2.80c. to 2.85c., mill shipment. For small lots from store 3.10c. to 3.20c., Chicago, is obtained. Galvanized Sheets are selling at 3.35c. to 3.40c. net, mill shipment, while small lots are selling at 3.80c. to 4c. net, from store, for No. 27.

Cast Pipe.—There is a fair inquiry for small sizes for immediate delivery, but the largest manufacturers cannot make shipment on 4's and 6's before December 1. The demand for large sizes is about over for this season. Manufacturers continue to sell small lots as follows: 4-inch, $37; 6-inch, $36; 8-inch and upward, $35; Gas Pipe, $1 per ton higher, all f.o.b. Chicago.

Billets.—There has continued to be a fair inquiry for domestic Open Hearth Billets, with small lots selling at $36 to $40, according to analysis, buyer and time of delivery. There is considerable business in foreign Billets held in abeyance pending the settlement of the duty question, but for the time being prices are entirely nominal.

Merchant Pipe.—There has been a lack of animation, and buyers anticipating lower prices are holding off. Competition is still keen and additional discounts to those given below are said to be allowed. The following are the prices current, random lengths, Chicago: Black, ⅛ to ½ inch, 56½ off; ¾ to 12 inches, 63½ off; Galvanized, ⅛ to ½ inch, 43½ off; ¾ to 12 inches, 50½ off. Some manufacturers are making the following prices for mill shipments, Chicago: Random lengths, Black, ⅛ to ½ inch, 60 off; ¾ to 12 inches, 67 off; Galvanized, ⅛ to ½ inch, 48 off; ¾ to 12 inches, 56 off.

Boiler Tubes.—There has been a more active inquiry during the past week, and some large sales have been effected. The larger manufacturers are said to be sold up from two weeks to four months, but independent companies are able to make earlier shipments; and competition being more keen an additional discount of 5 and in some cases 5 and 2½ has been allowed over the following discounts for mill shipments:

	Steel.	Iron.
1 to 1½ inches	43½	40½
1¾ to 2½ inches	56	38½
2¾ to 5 inches	61	48½
6 inches and larger	56	38½

There has been a better demand for small lots from store, but discounts additional to those given below are reported to have been made recently:

1 to 1½ inches	35	35
1¾ to 2½ inches	47½	32½
2¾ to 5 inches	55	42½
6 inches and larger	47½	..

Merchant Steel.—There has been a fair degree of activity during the week, there being more specifying and some new business of moment daily for Machinery and Tool Steel. For mill shipment prices are as follows: Smooth Finished Machinery Steel, 2c. to 2.10c.; Smooth Finished Tire, 1.95c. to 2.10c.; Open Hearth Spring Steel, 2.65c. to 2.75c.; Toe Calk, 2.25c. to 2.40c.; Sleigh Shoe, 1.85c. to 1.90c.; Cutter Shoe, 2.40c. to 2.60c.; Cold Rolled Shafting, 47 off in carload lots and 42 off in less than car lots. Ordinary grades of Crucible Tool Steel are quoted at 6c. to 7c. for mill shipment; specials, 12c. upward.

Rails and Track Supplies.—There has been no diminution in the demand for either Heavy or Light Sections, first or second quality of Rails. A number of small orders ranging from 500 to 2000 tons have been placed during the week,

aggregating about 14,000 tons, mainly for delivery during the first half of next year. One lot of 45,000 tons is under negotiation. About 2000 tons of second quality have been sold for early shipment. The demand for Light Sections keeps up to an unprecedented extent. Official prices continue strong at $28 for standard and $27 for second quality, mill shipments. Lighter Sections range from $32 to $38 in carload lots, with a premium of $3 to $5 per ton obtained for small quantities. Track Supplies of all kinds have continued to sell readily with full prices obtained. The following are the prices current: Splice Bars or Angle Bars, 2c.; Spikes, 2.50c.; Track Bolts, with Hexagon Nuts, 3.10c. to 3.45c.; Square Nuts, 2.95c. to 3.10c.

Old Material.—Four of the largest local railroads have disposed of about 10,000 tons of various kinds of Scrap during the week, and with many of the mills closed down the market has developed a little easier feeling, which has been more apparent in such lines as Iron Car Axles, Railroad Wrought and Dealers' Forge. On the other hand Old Car Wheels, which are very scarce and wanted, command much higher prices. It is almost impossible to get reliable quotations. There has continued to be a fair demand for Heavy Relaying Rails on the basis of quotations, and one lot of 1000 tons, second quality, was sold at $31. The Burlington & Wisconsin Central are offering to-day about 2000 tons of Scrap of various kinds. The following are the prices current per gross ton, Chicago:

Old Iron Rails	$25.00 to $25.25
Old Steel Rails, mixed lengths	19.00 to 19.25
Old Steel Rails, long lengths	23.50 to 24.50
Heavy Relaying Rails	32.00 to 32.50
Old Car Wheels	24.00 to 25.00
Heavy Melting Steel Scrap	18.50 to 18.75
Mixed Steel	15.50 to 16.00

The following quotations are per net ton:

Iron Fish Plates	$22.50 to $22.75
Iron Car Axles	.... to 25.00
Steel Car Axles	23.50 to 24.00
No. 1 Railroad Wrought	21.00 to 21.50
No. 2 Railroad Wrought	18.50 to 19.00
Shafting	20.00 to 21.00
No. 1 Dealers' Forge	17.00 to 17.50
No. 1 Busheling and Wrought Pipe	15.00 to 15.50
Iron Axle Turnings	15.00 to 15.50
Soft Steel Axle Turnings	14.50 to 14.75
Machine Shop Turnings	14.25 to 14.75
Cast Borings	10.25 to 10.75
Mixed Borings, &c	10.50 to 11.50
No. 1 Boilers, cut	14.50 to 15.00
Heavy Cast Scrap	17.00 to 17.50
Stove Plate and Light Cast Scrap	13.00 to 13.50
Railroad Malleable	16.25 to 16.75
Agricultural Malleable	16.00 to 16.25

Metals.—Copper has developed a stronger tone, in sympathy with primary markets, but business here is mainly confined to small lots. Lake is held at 12⅛c. in carload lots and 12½c. to 12¾c. in a jobbing way. Pig Lead has continued to sell well, and the market has ruled firm at 4.05c. in 500-ton lots, 4.07½c. in carload lots and 4.10c. in a jobbing way. Sheet Zinc has also been stronger, with a fair demand at 6½c. in carload lots and 6.65c. in lots of 600 lbs. Old Metals have been in better demand, firm in tone and with the exception of Zinc without essential change in prices. Heavy Cut Copper, 10½c.; Red Brass, 10⅝c.; Copper Bottoms, 9½c.; Lead Pipe, 3.90c., and Zinc, 3.85c.

Coke.—There have been freer offerings of Colorado Coke, which has been sold in this market at $12 to $12.50, and moderate amounts of Virginia Coke have been sold at $14 to $14.50 on track, Chicago. Deliveries of Connellsville Coke on contracts are said to have improved somewhat. Further contracts of Virginia Coke for next year's delivery are reported on the basis of $3.50 at the ovens.

Philadelphia.

FORREST BUILDING, October 21, 1902.

The Iron and Steel situation has not changed very much since date of our last report. Coke is lower, but it is still very hard to get, so that the consumption as well as the production of Iron is greatly restricted. This imparts a feeling of indifference, which is in marked contrast to the situation during the summer months, but under the circumstances it could hardly be otherwise. The greatest hindrance to business activity is the scarcity of Coke, and unfortunately there is very little prospect of betterment in the near future. The same difficulty is reported in the West and Central West, so that the outlook for winter work is by no means encouraging. Paradoxical as it may seem, we are in the midst of plenty, and at the same time in the midst of a famine, the outcome of which it is impossible to foresee. For the present the feeling is not as hopeful as could be desired. Makers of Pig Iron are confronted with a cost of production entirely unforeseen, while the profits of consumers are cut down by irregular and costly supplies, which materially reduces their working margin. Normal conditions will be resumed after a while, but in the interim time is being wasted and money thrown away without benefit to either capital or labor. Under these circumstances the situation cannot be regarded as satisfactory, although it is hoped that the tendency from this time forward will be toward a leveling down of these mountainous obstructions. If prices are a criterion of business conditions, the immediate situation is less favorable than it has been. Pig Iron, for reasons which need no explanation, is firm and scarce, but apart from that (and Plates) there is an undoubted sagging of the market, and almost everything on the list is moving in buyers' favor. Declines are not important, and are not distinctly evident in all lines, but there is just enough to convince buyers that there is no probability of higher prices in sight at the present time, consequently there is a disposition to take hold sparingly, pending further developments. More specific details will be found under the various headings of the articles which appear most likely to be affected. Billets, it will be noticed, are likely to work toward lower figures.

Pig Iron.—The market is quiet but firm. The majority of consumers have plenty of Iron due them, but as the sellers are unable to make deliveries as expected, there is a floating demand more or less urgent, some days active, other days only moderate, and others nothing doing. Consumers who have bought Iron at low prices are not anxious to replace it with material at higher figures, and only do so under the stress of circumstances. The difficulty at present is the uncertainty in regard to the time when deliveries on these back orders can be commenced. Buyers are all living in hope, but the prospect of realization is not strong, consequently the buying of small lots to tide over has become a steady thing, and whatever comes on the market is taken up immediately at pretty full prices. There is an impression that these are temporary conditions, which is no doubt true, but there is nothing likely to lead to a change for a considerable time to come. The cost of importing Iron is somewhat higher, but the chances of an advance beyond to-day's quotations are not strong, although the prospect of a decline is at least equally improbable. The situation from every point of view is one of extreme difficulty, and for the time being there is a disposition to drift along with the tide until there is something more tangible in prospect. Foreign Iron is in general use, and for the present fixes the prices in this and the adjacent territory. Quotations are nominally the same as last week and are about as follows, cargo lots $1 to $1.50 less:

Low Phosphorus	$22.00 to $22.50
East Coast Bessemer	21.50 to 22.00
No. 3 Middlesbro	20.50 to 21.00
Scotch, No. 1	22.50 to 23.50
Scotch, No. 3	21.00 to 21.50
Westphalian, No. 2 Plain	20.50 to 21.25

American brands for city or nearby deliveries during the first half of next year may be quoted as follows, and $1 to $1.50 more for this year's deliveries:

No. 1 X Foundry	$23.50 to $24.50
No. 2 X Foundry	22.00 to 22.50
No. 2 Plain	21.00 to 22.00
Standard Gray Forge	19.50 to 20.50
Basic	20.50 to 21.00

Billets.—The condition of the Steel market is difficult to define, but the tendency is toward lower prices. American Steel has been sold at a sharp reduction, and as the claim for higher duties on foreign Steel is likely to be abandoned, prices may get back to the figures ruling three or four weeks ago. Meanwhile it would be difficult to quote exact prices, but November and December deliveries could certainly be done at $31 to $32, and considerably less for foreign for shipments at a later date.

Plates.—The demand is very active and for the present the mills are very much behind with deliveries. The shortage of fuel has caused a considerable decrease in production, and while they expect to do better in the near future, there is no certainty that they will be able to do so. Fuel is a "burning question" at the present time, and it will probably be more so if bad weather sets in. Manufacturers of Plates are doing the best they know to accommodate their regular trade, but there is a considerable overflow of outside business which will have to take its turn. Prices nominally unchanged but very strong, as follows: Small lots, 2.10c. to 2.15c.; carload lots, ¼-inch and thicker, 2c. to 2.05c.; Universals, 2c. to 2.05c.; Flange, 2.10c. to 2.20c.; Fire Box, 2.25c. to 2.30c.; Marine, 2.30c. to 2.35c.; Charcoal Plates, C. H. No. 1, 2½c.; C. H. No. 1 Flange, 3c.; C. H. No. 1 Flange Fire Box, 3½c.

Structural Material.—There is a heavy demand for Structural Material, but there seems to be less difficulty in getting deliveries. This is largely due to the constant arrivals from abroad, as well as to the increasing capacity for home production. Prices are naturally very irregular, as some specifications can be delivered immediately, while others have to take their turn to be rolled. Spot lots from store for sizes in stock are quoted at about 2.25c., or for a good round lot 2.10c. to 2.15c. Mills are quoting 1.75c. to 1.80c., but they require 60 or 90 days for delivery, yet there is no doubt that conditions are getting easier.

Bars.—There is an increasing pressure to secure orders for both Iron and Steel Bars, and while quotations are not quotably lower, the tendency is in that direction. The monthly meeting of the Bar Iron Association was held last Thursday, but no action was taken in regard to prices, although it was stated that the official rate of 1.92c. had been

broken in some instances, but not by mills that were in the association. Steel Bars can be had at about 1.75c. to 1.80c. for good sized lots, but deliveries are not promised before December, although they may be delivered before that time. The general trend of prices, however, is toward increased easiness.

Sheets.—There is a materially improved demand, and there would be no difficulty in securing a considerable tonnage at a price. Mills in this vicinity, however, are not inclined to announce any general reduction, but of course quotations are regulated according to the size and character of the order. For the present they are running full time, and have a moderate amount of work under engagement.

Old Material.—Prices are very irregular, and it is hard to say just what the market is; some say better, some say dull, but without any distinct character. The general market is indicated by the following for lots delivered in buyers' yards:

Old Steel Rails	$21.50 to $22.00
Heavy Steel Scrap	20.50 to 21.25
Low Phosphorus Scrap	26.50 to 27.50
Old Steel Axles	26.00 to 27.00
Old Iron Rails	24.50 to 25.00
Old Iron Axles	30.00 to 31.00
Old Car Wheels	19.00 to 20.00
Choice Scrap, R. R. No. 1 Wrought	23.50 to 24.50
Country Scrap	20.00 to 21.00
Machinery Cast	19.50 to 20.00
No. 2 Light Scrap	17.00 to 18.00
No. 2 Light (Ordinary)	14.50 to 15.00
Wrought Turnings	16.00 to 17.00
Wrought Turnings, Choice Heavy	18.00 to 18.50
Cast Borings	10.00 to 10.50
Stove Plate	15.50 to 16.00

Imports—For the two weeks ending October 18 are as follows, excluding Ores, 13,363 tons, value $210,388.

	Tons.	Value.
Iron Ore	7,904	$15,559
Ferromanganese	942	34,983
Ferrosilicon	50	1,125
Pig Iron	5,750	79,973
Scrap Iron	2,736	29,372
Scrap Steel	2,360	29,885
Steel Rails	215	5,375
Steel Bars and Ingots	753	14,814
Beams and Angles	252	5,611
Terne Plates	10	1,288
Wire Rods	205	7,962

(*By Telegraph.*)

An all around reduction in Ferromanganese has been made to $50.

St. Louis.

CHEMICAL BUILDING, October 22, 1902.—(*By Telegraph.*)

Pig Iron.—Tonnage shows no particular increase, and the market is very quiet so far as the volume of new business is concerned. The topic of some discussion in the trade the past week has been the freight rate from the Birmingham district, and this subject has been variously interpreted. We understand from authoritative sources that the old rate of $3.25 to St. Louis is to be allowed the furnaces for the balance of this year on shipments applying on old contracts which were on the books previous to the notice of advance by the railroads which took effect on September 15. All orders now being accepted are based on a freight rate of $3.75. We quote, f.o.b. St. Louis as follows:

Southern, No. 1 Foundry	$24.25 to $28.75
Southern, No. 2 Foundry	23.75 to 27.75
Southern, No. 3 Foundry	23.25 to 26.25
Southern, No. 4 Foundry	22.75 to 25.75
No. 1 Soft	24.25 to 26.25
No. 2 Soft	23.75 to 25.75
Gray Forge	22.75 to 24.75
Southern Car Wheel Iron	.... to ....
Malleable Bessemer	.... to ....
Ohio Silvery, 8 per cent. Silicon	.... to ....
Ohio Strong Softeners, No. 1	.... to ....
Ohio Strong Softeners, No. 2	.... to ....

Bars.—While the trade being handled by the jobbers does not show any marked increase in volume over recent weeks, the buying is said to be of a very satisfactory character. Some new inquiry continues to show, and in the matter of prices jobbers repeat the former quotations. We quote from the mills: Iron Bars at 1.85c. and Steel Bars at 1.80c. to 1.95c. Jobbers quote Iron Bars at 2.25c. and Steel Bars at 2.25c.

Rail and Track Supplies.—The inquiry and demand in this department of the market continues in large volume, and the sales departments at this point have negotiated some very important sales for delivery during the first half of 1903. Report continues to be heard of the mills being well sold into the new year. We quote as follows: Splice Bars at 2.10c.; Bolts, with Square Nuts, at 3c. to 3.10c.; Hexagon Nuts, 3.25c. to 3.30c., and Spikes at 2.50c. to 2.60c.

Angles and Channels.—The jobbing trade continue to care for a very fair demand for Small Angles and Channels, and improvement in this demand is looked for, judging from the amount of inquiry which is said to be showing. For material of this class, 2.50c., base, from store is asked.

Pig Lead.—The underlying conditions in the market for Pig Lead in the matter of demand and prices are very strong and firm, but any especial activity is lacking. Chemical at 4c. to 4.02½c., and Desilverized at 4.05c.

Spelter.—Active and strong conditions continue to rule in the Spelter market, and with the present prospect of an early resumption of operations in the Coal industry the smelting companies are expecting an increase in the consumers' requirements. The bid price at this time is 5.20c., with 5.25c. asked.

F. A. Goodrich Iron & Steel Company have just been incorporated, and will conduct a general sales agency in St. Louis, Mo., for Pig Iron, Coke and Iron and Steel products. A suite of offices in the new Bank of Commerce Building will be the business headquarters of this corporation. They have been given the Southwestern agency of the Jones & Laughlin Steel Company, and will act in a similar capacity for a number of other interests. F. A. Goodrich, the active head of the company, commenced his business career in 1883 with Charles Himrod & Co. in Chicago, Ill., and in June, 1884, was transferred to their Detroit, Mich., branch. He afterward associated himself with W. F. Jarvis & Co. on their succession to the Detroit end of Charles Himrod & Co. This connection lasted from 1889 until April 1, 1895, when he organized F. A. Goodrich & Co. of Detroit, Mich., which company will continue to exist and as before act as Michigan agents for Jones & Laughlin Steel Company and others.

Birmingham.

BIRMINGHAM, ALA., October 20, 1902.

It is a hard matter to properly diagnose the Iron market. A few have had some little cash and nearby delivery Iron that they were willing to let go, and they have let it be known. There were plenty of buyers to compete for it, and such lots still find a ready market. These sellers report a more active inquiry for the week, and say that the inquiry for the first half of 1903 is better. But the majority of the large sellers report rather a quiet time of it. The truth is that a majority of the large interests are yet practically out of the market on new business, having their hands full in delivering on old orders. And it will be months yet before some of them are evened up. A leading official of a leading company said to your correspondent: "We are all practically in the same boat, for we are all sold pretty well up for the first half of 1903, and it is simply a question with us all of delivery on sales." There are plenty of belated orders, with a poor prospect of overtaking them in the near future. There is not much being done in the way of maximum capacity, but there is a good deal of falling below that capacity in actual results.

Now that labor troubles are reconciled there is a prospect for some improvement. Even if it comes the task of catching up is a big one, and there is going to be mighty little surplus Iron for sale by this district for the first half of 1903. The same great irregularity in price of cash Iron as heretofore reported still exists. Each sale depends on circumstances, and no two are alike. No. 2 Foundry has sold at $24 and also at $25. No. 1 Foundry has sold at $25. When you come to Gray Forge reports differ as to price, and it is hard to quote it, as reports range from $16 up to $18 and $19.

It is announced in the public press that one Iron firm will import certain grades in demand and of great scarcity, but the resident manager gave your correspondent no intimation of such intention, and it is simply given as gossip. For the first half of 1903 sales have been made at from $21 to $23, but the outside figures have not been the guiding rule. They have been the exception to the rule, and the lower figures rather indicate the market. But there have been sales at the extreme figures. The only way to characterize the market is to call it "piratical." The interests that usually dominate prices are out of the market, and prices are fixed not on a business basis but on the necessities of the buyer; and, as a rule, the buyer fixes the price on himself by his own bids. At present writing there is no relief in sight from this condition of affairs. The market must work out its own salvation, and in time supply and demand will govern.

At a late meeting of the Southern Iron Association the fact was developed that large sales of Iron were not covered in reports thereto, although made in good faith. The result was that forgiveness was extended and sales then made were accepted and registered, which left the interests affected protected in all their rights.

There are reports from seemingly good authority that three or four new furnaces will be erected in the district, and the Tennessee Company get the credit for their erection. The recent sales at Sheffield, according to reports, is but the transfer of interests from that district to this district. But those in authority are not yet ready to talk for publication. While it has been impossible to obtain any authoritative information as to the intentions of the Alabama Steel & Wire Company information has leaked out to your correspondent to the effect that Gadsden has been selected as the site of their plant. There was a sale there of over 400 acres of land admirably located for their purposes the past week, and while it was bought by an Anniston party the information comes to your correspondent that the real buyer was the Alabama Steel & &Wire Company. The plans include a ten-

furnace Steel plant of 50 tons each. The blast furnaces to be erected will probably go there, too. It is an open secret that close relations exist between the Steel & Wire Company and the Southern Car & Foundry Company, and the latter are largely interested in Gadsden. Besides that, their Ore mines are in that neighborhood, and their location there would seem to be logical. However, it is impossible to obtain anything authoritative. But it is a question of only a few days.

The Williamson Furnace will be in blast before this is in print, and it will be on the market as a seller, having no complications in the way of future sales.

The differences between the Tennessee Company and their miners was settled the past week through the intervention of some public spirited citizens. No information is obtainable as to the terms of settlement, but the feeling is that it was a case of mutual concession. Anyway, all disturbing factors at the various mines are eliminated, and the prospects for continuous operation are good. This action has greatly relieved the situation here and put new life into affairs. There is no co-operation yet on the part of the operators, and each interest are running their own affairs as circumstances prompt.

According to market quotations all the elements that enter into the making of Iron have advanced in price, so that one entering the market as a maker of Iron would find no big profit in its manufacture if he bought his supplies at current prices. With Coke selling at $7 per ton and Ore at $1.75 and Limestone at 50c., and other current expenses added, no neophyte can enter the field under $17 to $17.50. It is not meant to say that the Iron being made costs that figure, but the statement shows that the opportunities for making cheap Iron have been pretty well taken up. For Coal there has been a good demand at the rate of $2 per ton "run of the mine" and shipments have been limited because of scarcity of cars. There is plenty of old business to be yet concluded at lower prices.

There have been some good orders registered at $7 for Coke and in some instances higher prices have been obtained. It is not so much a question of price as it is of obtaining the article.

The Dimmick Pipe Works are enlarging their plant and preparing for the increased business that has come to them. They are running up to full capacity. Improvements, additions and enlargements going on in all lines are a matter of comment. Work is now in progress on our second sky scraper, and the construction outfit of the contractors building the Seaboard Air Line Railroad arrived Saturday night and operations will commence at once.

It has come authoritatively to your correspondent that orders have been taken for 1000 tons and more of Scotch Pig Iron to be delivered in the Southern field. Here we are claiming to be the cheapest production center of Iron in the world, yet we are actually importing Iron from one of the highest cost producing sections of the world. There is both food for comment and thought in this transaction. Until labor meets the demand that prevails for it this district is hampered and it will be months before we can enter the field as an active factor in it. We no longer for the time being dominate the price of Iron. That is a clear case.

Cleveland.

CLEVELAND, OHIO, October 21, 1902.

Iron Ore.—The first radical change in the carrying rates on Iron Ore occurred during the past week. The shipment of grain is becoming a more and more powerful factor in the lake business, and the Ore shippers have found themselves short of tonnage at times when they wanted it. This led to an offer on the part of the United States Steel Corporation of an increase of 5c. in the freights from the head of the lakes to Ohio ports, at the same time conceding the advance which the vesselmen have been demanding on Escanaba shipments, but which had not been generally paid heretofore. The voluntary increase gave the vessel interests an idea of the strength of the market which had not been apparent before, and they at once began to contend for a still higher rate. They refused the 80c. rate offered out of Duluth and asked 85c., which was paid the following day by one shipper. About that time the Steel Corporation withdrew from the market and were followed by most of the other big shippers. They contend that the small amount of Ore yet to be brought down the lakes does not warrant any excessive increase in the carrying charges and will try to break down the rates by withholding their shipments. They admit that there is some wild Ore yet to be moved, and this knowledge is making the vessel interests determined on the higher freights. An additional motive to the boat owners is that their tonnage has been faring none too well this year because of the delays. The rates are 85c. from Duluth, 65c. from Marquette and 60c. from Escanaba.

Pig Iron.—Several ideas prevail as to the possible effect of resumption of operation in the Anthracite Coal region upon the Coke supply. One is that the freeing of railroad equipment from the long hauls of Bituminous Coal into Eastern territory will give a better supply in this market for the uses of the consumers of Coke and Pig Iron. In this connection, however, it is necessary to recall that most of those long hauls have been made by equipment which was borrowed from the Anthracite Coal region and the withdrawal of that equipment from this market to care for the Eastern movement of Coal may leave the shippers here worse off than they were before, especially as the immediate production of Hard Coal will most likely not be sufficient for Eastern needs, and the shipment of Bituminous Coal will continue into that territory for some time to come. The Coke difficulties, which have been in a large measure attributed to the situation East, will, no doubt, be improved presently, but as yet that is decidedly uncertain. Some relief is sorely needed from the present Coke shortage. The supply at best is intermittent, and the furnaces are running hand to mouth all the while. This has affected the market to such an extent that recently the Steel Corporation made inquiry of the Basic and Bessemer producers, and the association refused to quote any price whatever until the price of Coke during the second half of next year was known. The Coke quotations for the future have not been made, and the forward buying of Pig Iron has been stopped. As to the present demand for material, the week has been rather quiet. Consumers have not been on the market in any numbers for material, and the furnacemen may be said to have welcomed the relief. In a good many instances consumers have become impatient at the delays which have been occasioned by the Coke shortage and have insisted upon deliveries on their contracts. The quieter times in the market leave room for the furnacemen to catch up on those deliveries without any temptation to meet an urgent demand upon the open market. The present situation appears to be a lull rather than anything of a permanent nature. The whole situation seems to make it absolutely imperative that sooner or later the buying shall resume with that intensity which has characterized it so far. For the present the importation of Iron is easing up the situation for the consumers and permitting the furnacemen to get on their feet. The tests that have lately been made of imported Iron are in a measure satisfactory, and while the results are not as good as those produced by the home Irons, they are, nevertheless, in a way, satisfactory. This will likely increase the importations during the next few weeks. Foreign Iron, however, is not a permanent factor in this market. Import prices do not change from $25.50 for No. 1 and $24.50 for No. 2 Scotch Irons and $23.50 for No. 2 Nova Scotia Irons. For Foundry Iron No. 2 is bringing $25 in the Valleys and Southern Iron is now quoted at $20, Birmingham, as a minimum. On future sales during the first half of next year No. 2 Foundry is bringing $23 to $23.50, while $21 is quoted for the third quarter; Southern Iron is quoted at from $19 to $20.50, Birmingham, for first half delivery. Basic is bringing $20.50 to $21 for first half delivery, while Bessemer is selling at $23 for this year and at $21 for the first half of next year, all sales being made by furnaces not included in the association.

Finished Iron and Steel.—Steel mill men have been experiencing the greatest difficulty during the past week or ten days in making deliveries of material previously ordered. They have been hampered in this respect by a scarcity of cars, which is accounted for by the enormous movement of Coal and Ore and by the use of power for the movement of an unprecedented amount of general merchandise. The Plate trade continues to be the leading factor in the Steel market. Inquiries have been coming in freely during the past week both from those who have covered little or none of their possible needs and from others who have already made liberal contracts and find that they need more. The larger mills have no material whatever for sale during the first half of next year and have sold none for the third quarter as yet, although some inquiries for that period have been made. This situation is playing into the hands of the smaller and so called independent mills. They are taking in the excess business at premiums ranging well up. In a number of instances good sized orders have been placed with these small mills at present prices for next year's delivery, and in a few isolated cases the contracts have entailed deliveries entirely up to July 1. The smaller mills, however, are holding off, refusing to take many contracts or to tie up their capacity even at the premium now offered. Jobbers in the meantime are getting a good deal of business for spot delivery which the smaller mills cannot take care of, the question of price hardly entering into consideration. The market is strong for mill shipments at 2c. to 2.10c., and while no effort has been made so far to increase the premium on this material it is understood that such is not altogether out of the question before long. Jobbers continue to get 2.50c. for both Universal and Sheared Plates. On Sheets the market is still a little weak even at the reduced prices and it is apparent that there is something approaching an overproduction, not because the consumption is not as large as in the other trades, but productive energy is considerably ahead of the present requirements and is likely to continue so for a while. Prices may be quoted as follows: On Black Sheets in carload lots, from

the mill, 2.85c. to 2.95c. for No. 27 as a base, and out of stock 3.10c. to 3.25c. for the same gauge. Galvanized Sheets are quoted at 3.70c. to 3.85c. for No. 27 as a base. In the Structural market the past week has been a lull, which, however, has not showed any signs of a permanent decline. In fact, the inquiries show another tendency altogether. The mills have still some uncovered capacity for the first half of next year, against which they are taking orders steadily at the old association price of 1.60c., Pittsburgh. The smaller or so called independent mills are getting all of the business they can care for at premium prices for this year's delivery, quoting 2.60c. to 3c., which they obtain without difficulty. Jobbers are in the market with only a limited supply of material, having but a few sizes on which they can make any quotation whatever. They are still quoting 2.50c. to 3c. The Bar Steel situation does not change in the least, the demand being steady and orders more or less free, but not excessive. The prices do not change from 1.60c., Pittsburgh, for Bessemer, and 1.70c., Pittsburgh, for Open Hearth. The Bar Iron situation is still slightly off, as are the other Iron articles, such as Bands and Sheets. The mills have joined in a quotation of 1.80c., Youngstown, which is a decrease of $1 from the last general quotation. The market is weak even at that price. The Billet situation does not change from previous announcements, the price quoted being $30, Pittsburgh, with but few big sales.

Old Material.—The market has been quiet during the week, but few sales of importance having been made. Cast Scrap seems to be very hard to obtain, and the collectors are demanding exorbitant prices of the middlemen, making it almost impossible for them to turn it over to the consumers with any profit. The same spirit pervades the entire market to a greater or less extent. Prices continue as follows: No. 1 Wrought, $21, net; Iron Rails, $27.50, gross; Iron Axles, $28, net; Cast Borings, $12, gross; Wrought Turnings, $16.50, gross; Cast Scrap, $17.50, gross; Car Wheels, $19, gross; Heavy Melting Steel, $19, gross; Old Steel Rails, $20, gross.

Cincinnati.

FIFTH AND MAIN STS., October 22, 1902.—(*By Telegraph.*)

The Pig Iron market in most of its branches is rather quiet just now so far as this territory is concerned. The trading is confined mainly to odd lots of small tonnage and at all sorts of prices. For instance, a couple of cars of No. 1 Soft Virginia Silicon for prompt shipment are quoted at $26, Birmingham basis. No. 1 Foundry is reported sold in small lots, quick shipment, at from $23.75 to $25, same basis. Gray Forge has been sold to unusual consumers of such grades as high as $18.50, Birmingham, which is $2 above what most authorities say can be had for it from the mills. There is still very little Iron offering for the first half of 1903 delivery. A feature in the market is the selling of some Alabama Coke for delivery in an Ohio River city at $11, f.o.b., which means about $7.75 at the ovens. Connellsville Coke is selling for 1902 shipment at from $9.10 to $11, f.o.b. Cincinnati, with a freight rate of $1.10 from ovens. Freight rate from the Hanging Rock district is $1.10, and from Birmingham to Ohio River points $3.25. We quote, f.o.b. Cincinnati, for 1902 delivery, as follows:

Southern Coke, No. 1	.... to $27.25
Southern Coke, No. 2	.... to 26.25
Southern Coke, No. 3	.... to 24.50
Southern Coke, No. 4	.... to 22.50
Southern Coke, No. 1 Soft	.... to 27.25
Southern Coke, No. 2 Soft	.... to 26.25
Southern Coke, Gray Forge	$19.75 to 21.25
Southern Coke, Mottled	19.75 to 21.25
Ohio Silvery	30.10 to 31.10
Lake Superior Coke, No. 1	26.10 to 26.60
Lake Superior Coke, No. 2	25.60 to 26.10
Lake Superior Coke, No. 3	25.10 to 25.60
Car Wheel and Malleable Irons.	
Standard Southern Car Wheel	$27.25 to $28.25
Lake Superior Car Wheel and Malleable	25.00 to 26.25

Quotations for first six months of 1903, f.o.b. Cincinnati, the buyer to assume freight difference which may exist at time of shipment, are as follows:

Southern Coke, No. 1	$22.75 to $24.00
Southern Coke, No. 2	22.25 to 23.25
Southern Coke, No. 3	21.75 to 22.75
Southern Coke, No. 4	21.25 to 22.75
Southern Coke, Gray Forge	21.25 to 22.25
Southern Coke, Mottled	21.25 to 22.25
Southern Coke, No. 1 Soft	22.75 to 24.00
Southern Coke, No. 2 Soft	22.25 to 23.25
Lake Superior Coke, No. 1	26.60 to 27.10
Lake Superior Coke, No. 2	25.60 to 26.10

In reference to the quotations for 1903 it must be understood that the minimum figures for Southern Irons are applicable to Virginia brands, and the maximum solely to the Tennessee and Alabama product.

Old Material.—The market shows but little change. Cast Scrap is stronger. We quote dealers' buying prices, f.o.b. Cincinnati, as follows: No. 1 Wrought Railroad Scrap, $21 per net ton; Cast Scrap, $18 per gross ton; Iron Rails, $24.50 to $25, gross; Steel Rails, long, $24 to $24.50, gross; Steel Rails, short, $18.50 to $19, gross; Iron Axles, $27.75 to $28.25, net; Car Wheels, $21 to $21.50, gross.

Pittsburgh.

(*By Telegraph.*)

PARK BUILDING, October 22, 1902.

Pig Iron.—The Coke situation continues to be the disturbing factor in the Pig Iron trade, and it looks now as though it would be necessary for a number of the blast furnaces in the Pittsburgh district and also in the two Valleys to be idle more or less during the winter months, and if this comes true the Pig Iron situation will be a very serious one. Under present very favorable conditions the railroads are utterly unable to get Coke to the blast furnaces as fast as they need it, and should there be a good deal of snow next winter the railroads will be still more retarded in their operations. The furnace operators look on the coming months with a good deal of dread, and last week a number of stacks of the United States Steel Corporation were banked down waiting for Coke, as were also a number of stacks in the two Valleys. Steel plants and other consumers of Iron are short of metal right along and with no promise of early relief. There is not much doing in Pig Iron, as there is practically none for sale. Small lots of Bessemer Iron are $20.75 to $21 at furnaces. Nothing definite has yet been done on the large inquiry for Bessemer Iron of the United States Steel Corporation for shipment commencing next April and running through the balance of the year. This deal may be put through when the furnaces have been advised as to the cost of Furnace Coke for next year, which has not yet been done. It is very likely, however, that the price of Coke will be $3 or $3.25 a ton. Forge Iron is firm at $21.75 to $22, Pittsburgh, for shipment this year, Forge for shipment next year is $20.50 to $20.75, Pittsburgh. There is not much doing in Foundry Iron as consumers are pretty well covered.

Steel.—There is not much doing in Bessemer Steel and we quote the market at $29.50 to $30, Pittsburgh. For delivery over the first six months of next year it is probable that lower prices will be made. Open Hearth Billets are held at $32 to $35, Pittsburgh, depending on carbons.

Muck Bar.—The market on Muck Bars seems to be slightly weaker and we now quote best grades at $35.50, Pittsburgh. Possibly a lower price might be made on a firm offer.

Connellsville Coke.—While nothing official has been given out, it is pretty certain that the price of genuine Connellsville Furnace Coke on contracts running over all next year will be either $3 or $3.25 a ton. We may note, however, that some contracts for Furnace Coke for next year delivery have already been made at $3.50 to $4 a ton.

(*By Mail.*)

The Coke situation seems to be getting worse, and at this writing six or eight stacks in the two Valleys are banked down waiting for Coke. The railroads claim to be doing all in their power to better the situation, but so far without much success. There is not much doing in Pig Iron, as consumers are pretty well covered ahead. Prices are very firm and Bessemer Iron for prompt delivery is held at $22 to $22.50, Valley furnace. No settlement has yet been reached in regard to the proposed increase in duty on foreign Billets from $6.72 to $8.96 a ton. In Finished Iron and Steel a heavy tonnage is being placed in Plates and Structural Material, but the rest of the market is somewhat dull. A conference is now being held in this city between officials of the American Tin Plate Company and the Amalgamated Association over the proposed reduction of about 25 per cent. in wages when the men are working on Tin Plate for export, but no settlement of the matter has yet been reached. While the vote will be close, it is probable the men will agree to accept the reduction.

Spelter.—Market continues very firm, and we quote prime grades of Western Spelter from 5.27c. to 5.33½c., depending on deliveries wanted. We note sales of about 200 tons at 5.27c.

Bars.—Very few large orders are being placed, but a moderate tonnage of small lots is being given the mills. The mills are pretty comfortably filled, but have not as much tonnage ahead as some time ago. We quote Steel Bars at 1.60c., at mill. All specifications for less than 2000 lbs. of a size are subject to the following differential extras: Quantities less than 2000 lbs., but not less than 1000 lbs., 0.10c. per lb. extra. Quantities less than 1000 lbs., 0.30c. per lb. extra, the total weight of a size to determine the extra regardless of length. We quote Iron Bars at 1.80c. to 1.85c. in carloads and 1.90c. in small lots, f.o.b. Pittsburgh, half extras as per National card.

Plates.—The Plate market continues very active, and mills that can make deliveries of Plates any time this year have no trouble in getting from 1.75c. to 1.90c. on large orders. Small lots of Plates for prompt shipment readily command 2c. at mill. The mills all have an enormous tonnage booked, and indications are that the Plate trade in 1903 will be the heaviest ever known. Some of the mills are booked up solid for the first six months. Official prices, governing

indefinite deliveries of Plates, are as follows: Tank Plate, ¼-inch thick and up to 100 inches in width, 1.60c., at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine, Ordinary Fire Box, American Boiler Manufacturers' Association specifications, 1.80c.; Still Bottom Steel, 1.90c.; Locomotive Fire Box, not less than 2.10c., and it ranges in price to 3c. Plate more than 100 inches wide, 5c. extra per 100 lbs. Plate 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra; No. 9, $5 extra. These quotations are based on carload lots, with 5c. extra for less than carload lots; terms, net cash in 30 days.

Hoops and Bands.—A fair amount of tonnage is being placed, and the three leading mills are comfortably filled. We may note that prices are much firmer, and are said to be rigidly held. We quote Hoops at 1.90c. for 250-ton lots and over and 2c. in carloads. Bands are 1.90c. for Bessemer stock, 12-gauge and heavier, while for Open Hearth stock $2 per ton advance is charged.

Structural Material.—Some large jobs have been placed since our last report. Among these are the machine shop of the Standard Engineering Company, at Ellwood City, 400 tons; new bridge over the Monongahela River for the Pennsylvania Railroad, 6000 tons; viaduct for the Tarentum Passenger Railway Company, 300 tons, and three viaducts for the Pittsburgh & Washington Railway, about 900 tons. A very large amount of bridge work is being placed, and most of the bridge shops are pretty well filled up through the first quarter of next year or longer. Slightly better deliveries for Structural Steel are now obtainable, but for these very high prices are paid. Beams and Channels for prompt shipment command from 2c. to 3c. a lb., prices depending altogether on the tonnage and how soon the material is wanted. The leading interest are said to be sold up on Structural Steel through the first half of 1903. Official prices governing indefinite deliveries are as follows: Beams and Channels, up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles, 3 x 2 up to 6 x 6 inch, 1.60c.; smaller sizes, 1.55c. to 1.60c.; Zees, 1.60c.; Tees, 1.65c.; Steel Bars, 1.60c., half extras, at mill; Universal and Sheared Plates, 1.60c. to 1.85c.

Sheets.—Several leading Sheet mills advise us that demand for Black and Galvanized Sheets is showing some improvement and that specifications on old contracts are coming forward more freely than for some time. As against this other mills report very little improvement in demand and state that contracts have been more or less disturbed by the recent reduction in prices. For 500-bundle lots and over we quote No. 27 Black Sheets, box annealed, one pass through cold rolls, at 2.65c., and No. 28 at 2.75c. For carload lots No. 27 is held at 2.70c. and No. 28 at 2.80c. Jobbers charge the usual advances for small lots from store. We quote Galvanized Sheets, No. 27 Gauge, at 3.60c., or 75 and 10 per cent. off list, and No. 28 at 3.85c., or about 75 and 10 off list. All above prices are f.o.b. at mill. Shipments of Sheets from the different mills are being very much retarded by lack of cars and motive power, and one leading interest advise us that their shipping department was shut down recently for one whole day awaiting cars.

Muck Bar.—We continue to quote domestic Muck Bar at $36, Pittsburgh, and note that the market is quite firm at that price. Eastern Muck Bar is being offered at $35 or lower, delivered, in this market.

Ferromanganese.—We continue to quote German Ferro at $51.25 to $51.50 and English at $52.50, Pittsburgh, in large lots. Small lots command higher prices.

Rods.—The market on Rods is fairly firm and we quote Bessemer at $36, and Open Hearth at $37, maker's mill.

Merchant Steel.—A fair amount of tonnage is being placed, but the output at the present time is no doubt larger than the tonnage that is being booked by the mills. A good many orders for Crucible Steel are being placed, but there is no change to note in prices. We quote: Tire, 2.15c. to 2.25c.; Spring, 2.25c. to 2.35c.; Toe Calk, 2.30c. to 2.40c., base; Sleigh Shoe, 2.15c. to 2.25c. Differentials are as follows: Less than 2000 lbs. of a size and not less than 1000 lbs., 10c. advance; less than 1000 lbs. of a size, 30c. advance; Cold Rolled Shafting is 47 per cent. off in carloads and 42 per cent. in less than carloads delivered in territory east of the Mississippi and north of the Ohio rivers. Tool Steel is 6½c. to 10c. for ordinary grades and 12c. and upward for special grades.

Skelp.—Very little tonnage is moving, and prices continue weak. We quote Grooved Iron Skelp at 1.97½c. to 2c. and Sheared at 2.10c., at mill.

Merchant Pipe.—The condition of the Pipe trade continues the same as noted in this report last week. Competition among the outside mills is very severe, and low prices are being made. It is generally expected that the leading interest will revise prices before long. Discounts on carload lots, on which an extra 10 per cent. and occasionally two 10's are allowed, are as follows:

Merchant Pipe.	Black.	Galvd.
⅛ to ½ inch, inclusive	60	48
¾ to 12 inch, inclusive	67	55

Coke.—Heavy stocks of Coke are piled up in the regions awaiting cars and motive power for movement, and unless the situation is soon relieved it will be necessary to close down a number of ovens, as very little more room is available for piling Coke. It is said the two Valleys could use about 500 cars a day, but are not getting more than half this amount. The output of the upper and lower Connellsville regions last week was about 305,000 tons. Prompt Coke continues to bring any price asked, and sales are being made every day at $8 to $10 and $11, at oven. There is no difficulty in getting $4.50 to $5 a ton on Foundry Coke for shipment in the first six months of 1903. It is claimed that several more contracts for Furnace Coke have been made for the first half of next year at $3.50 to $4 a ton at oven.

Iron and Steel Scrap.—The market is fairly active, but prices are not as firm as they were some time ago. We quote No. 1 Wrought Scrap at $21 in net tons; Heavy Melting Stock, $21.50 to $22, gross tons; Car Wheels, $23, gross tons; No. 1 Busheling Scrap, $17.50 to $18, in net tons, and Cast Iron Borings, $11.75 to $12, in gross tons.

Control of the Chloride Electrical Storage Syndicate, Limited, of England has been purchased by the Electric Storage Battery Company of Philadelphia, who have issued the following statement: "Soon after the incorporation of the Electric Storage Battery Company in Philadelphia a company were formed in England under the name of the Chloride Electrical Storage Syndicate, Limited. This company acquired all the patents and improvements, past and future, of the Electric Storage Battery Company for the world outside of the United States and Canada. Electrical development has been very slow in Great Britain, so that the company have only very recently reached a dividend paying basis. That a vast amount of electrical work is to be done in Great Britain in the next few years is shown by the very large works put up by the British Westinghouse Company and the British Thomson-Houston Company in Manchester and Rugby. The Electrical Storage Battery Company, seeing the opportunity for a large and profitable business not only in England but in other countries, where the low price of labor and material existing in Europe makes it impossible to compete with storage batteries manufactured in America, decided to purchase control of the English company. This has been done on a satisfactory basis, so that the Electrical Storage Battery Company will now realize large profits from the English business and will also be able to sell batteries in foreign countries and have shipments made from England and thus be in the very strongest possible position to handle the bulk of the business of the world."

Nothing more conclusively shows the enormous amount of tonnage that is being handled by the railroads west of Pittsburgh than the fact that the managers of the Pennsylvania lines west have decided to abandon the annual inspection of the roads and methods of operating officials. The reason ascribed for the unusual move on the part of the general managers is that the railroad men along the lines to be inspected have not the time to devote to the inspecting parties. In case they would take that time from business the operation of the freight would suffer immeasurably, much more in fact, than the condition, as it is now apparent, will permit.

Word comes from Chihuahua, Mexico, that the Guggenheim Exploration Company, who are the Mexican branch of the American Smelting & Refining Company, have concluded negotiations for the purchase of the rich mines of the Hidalgo Mining Company, situated in the Parral district, as well as of several other rich mines of that district. The amount involved in the several transactions aggregates nearly $8,000,000. The Hidalgo Mining Company are composed of Pittsburgh capitalists.

We understand that early in November a number of the leading officials of the United States Steel Corporation will make a tour of inspection of the plants of the constituent companies to determine the improvements and betterments to be made. Their report will be submitted to the Executive Committee, who will make the final decision and pass the appropriations.

New York.

NEW YORK, October 22, 1902.

Pig Iron.—The local market has been very dull, and consumers are purchasing only from hand to mouth, in the expectation that with the resumption of mining in the Anthracite regions there will become available considerable Pig Iron, due on old contracts. One of the leading consumers in this district couples with an inquiry for a large block of foreign the demand that importers guarantee analysis to be made by an American chemist. Some of the importers decline to bid under such circumstances. For delivery in 1903 the following quotations are made: Northern Iron, at tidewater, No. 1 X, $23.25 to $24.75; No. 2 X, $22 to $22.75; No. 2 Plain, $21 to $21.75. Tennessee and Alabama brands, in New York and vicinity: No. 1 Foundry, $23.25 to $23.50; No. 2 Foundry, $22.25 to $22.50; No. 3 Foundry, $21.50 to $22.

Steel Rails.—Reports that a large sale has been made to an Anthracite Coal road lack confirmation, and look extravagant on their face. The De Wendel mill has sold a lot of 15,000 tons, but this is supposed to be a part of the Harriman purchase made some time since. The reported sale of 40,000 tons by the Hoerde Works in Germany lacks confirmation here. It is possible that some of it is for the Canadian Pacific Railroad, which has now definitely closed for 55,000 tons, taken by five European mills, by far the greater part going to Germany.

Manufactured Iron and Steel.—Mills are sadly hampered by inadequate transportation facilities, interfering with their supply of fuel and delivery of finished products. Some of the largest works in Eastern Pennsylvania lost several days last week for lack of Soft Coal to run their gas producers. The demand meanwhile keeps up very well, especially for Shapes and Plates. Bridge work is active. The smaller shops are taking a great deal of business which cannot be handled by the leading interest. The Pennsylvania Railroad Company are receiving tenders this week on 18,000 tons of bridge work on which delivery must be made in six months. The limit on the delivery is likely to cause higher prices to be asked than had been expected. This is only part of the company's expected requirements. The New York Central will also purchase about 2500 tons. The Wells-Fargo Building in this city will be erected by the American Bridge Company, who secured the contract the past week. Foreign inquiry for bridges is increasing. The Plate business in sight is increasing, especially for shipbuilding. A novelty in this locality is a contract for a full rigged ship to be built by a local yard. It will take about 600 tons of steel. We quote, at tidewater, as follows, but for small lots and prompt delivery much higher prices are being obtained for Structural Material and for Plates: Beams, Channels and Zees, 2c. to 2.25c.; Angles, 2c. to 2.25c.; Tees, 2c. to 2.25c.; Bulb Angles and Deck Beams, 2.10c. to 2.25c. Sheared Steel Plates are 2.10c. for Tank, 2.20c. for Flange, 2.35c. to 2.40c. for Fire Box. Refined Bars are 1.95c. to 2c.; Soft Steel Bars, 1.95c. to 2.10c. Foreign Beams are 1.80c. and Angles 1.90c., ex-ship, New York, in 500-ton lots or greater.

Old Material.—Old Iron Rails and Wrought Scrap are somewhat easier, owing to the light demand from Eastern mills. Western works are still drawing large quantities of material from this market. Cast Scrap is moving very freely. Selling quotations are as follows, per gross ton, f.o.b. cars in this vicinity:

Old Iron Rails	$22.00 to $23.50
Old Steel Rails, long lengths	22.00 to 23.00
Old Steel Rails, short pieces	19.00 to 19.50
Relaying Rails, heavy sections	29.00 to 30.00
Relaying Rails, lighter sections	34.00 to 35.00
Old Car Wheels	20.50 to 21.50
Old Iron Car Axles	27.00 to 28.00
Old Steel Car Axles	26.00 to 27.00
Heavy Melting Steel Scrap	19.00 to 19.50
No. 1 Railroad Wrought Scrap Iron	21.50 to 22.50
Track Scrap	20.00 to 21.00
Busheling Scrap	15.00 to 16.00
No. 1 Machinery Cast Scrap	19.00 to 20.00
Stove Plate	13.00 to 14.00
Wrought Turnings, delivered at mill	16.50 to 17.50
Cast Borings, delivered at mill	10.00 to 10.50

William H. Leonori, for 20 years connected with Hogan & Son, has established himself under the style of William H. Leonori & Co. He has opened a Steel warehouse at 146 Worth street, and will handle all kinds of Crucible, Open Hearth and Bessemer Steel.

Metal Market.

NEW YORK, October 22, 1902.

Pig Tin.—Owing to a rapid rise in London this market advanced considerably. It is reported that the bull interests in London were squeezing the shorts, and it is also said that the bull movement there had some connection in this country. This report was circulated on the strength of the fact that spot Tin was advanced very rapidly here, and considerably over London prices. The highest price for the week was reached here on Monday, when spot was quoted 27¾c. to 28c. On that day the London price was £ 121 10s. for spot. Ever since the market has seen a steady reaction, which at the present writing finds prices as follows: Spot, 26.25c. to 26.95c.; October, 26c. to 26.35c.; November, 25c. to 26c., and December, 25c. to 25.55c. London closed £119 5s. for spot, and £117 10s. for futures. Throughout it all business here was very meagre. Arrivals so far this month amount to 1513 tons, while it is estimated that 2297 tons are afloat.

Copper.—With the announcement of the settlement of the coal strike a sentimental recovery of price was brought about, and while one of the warring factors immediately commenced to bid the price up the other filled them up well and made large sales. Between 15,000,000 and 20,000,000 pounds were sold for delivery during the next three months at prices ranging from 11.60c. to 11.80c. In the meantime prices soared to 12c., which figure was reached on Monday and was asked for all grades. Since then there has been a weakening in Electrolytic, Casting and Standard, but Lake has been nominally held at that figure. Business has been practically at a standstill. The following are the closing quotations to-day: Lake, 12c., nominal; Electrolytic, 11.62½c. to 11.87½c.; Casting, 11.62½c. to 11.82½c.; Standard, 11c., nominally. Any delivery from spot to December is named in connection with these figures. In sympathy with the advances here the London market reached £53 5s. on Monday as the highest point. Since then it has declined to £52 7s. 6d. and £52 12s. 6d., which were the closing prices for to-day. Best Selected had advanced 5 shillings on the week to £56 5s.

Pig Lead.—No additional information has been given out regarding the merger of the manufacturing interests. We are informed on good authority, however, that the transaction is practically completed and the details will be made known in a few days. The official quotation continues to be 4.12½c. for spot, and 4.10c. for futures; Desilverized, New York. London quotes £10 15s.

Spelter.—As for actual business the market is very quiet here. Prices are unchanged. A private report from the West states that additional firmness has been gathered there, due to the partial destruction by fire of one of the large Kansas gas smelters. Details are not yet to hand. Spot is quoted here 5.50c., while shipments from the West are obtainable at 5⅜c. The St. Louis market is very firm at 5.25c. for spot, and 5.20c. for November and December delivery. London quotes £19 5s.

Antimony—Is unchanged. Hallett's is quoted 7¾c., Cookson's 9½c., and other brands 7¼c. to 7½c.

Nickel.—No change is noted. Large quantities down to ton lots are now quoted at 40c. to 47c. per lb., according to size and terms of order. Smaller lots are quoted as high as 60c., according to quantity.

Quicksilver.—The market is quiet and unchanged, the ruling quotations being $48 per flask of 76½ lbs., each in lots of 50 flasks or more. London is unchanged at £8 15s.

Tin Plates.—The market is without change, the American Tin Plate Company quoting on a basis of $4.19 per box of Standard 100-lb. Cokes for delivery up to December 1 and $4, f.o.b. Pittsburgh district.

John Stanton reports the Copper production in the United States and of the foreign reporting mines and United States exports as follows, in gross tons of 2240 lbs.:

	Reporting mines.	Outside sources.	Total product.	U.S. Product foreign mines.	U. S. exports.
First half 1895	70,612	9,100	79,712	42,484	34,215
Second half 1895	84,885	6,600	91,485	43,674	30,507
Total 1895	155,497	15,700	171,197	86,178	64,722
First half 1896	94,180	7,200	101,380	42,255	58,216
Second half 1896	95,314	7,200	102,514	43,941	67,287
Total 1896	199,494	14,400	203,894	86,196	125,503
First half 1897	103,651	5,000	108,651	44,263	64,870
Second half 1897	100,555	6,900	107,455	44,007	64,340
Total 1897	204,206	11,900	216,106	88,270	129,210
First half 1898	112,687	7,800	120,487	40,880	68,284
Second half 1898	103,535	10,250	113,785	43,674	76,831
Total 1898	216,222	18,050	234,272	84,554	145,115
First half 1899	111,987	12,500	124,487	43,629	56,460
Second half 1899	118,818	18,900	137,719	45,611	63,351
Total 1899	230,806	31,400	262,206	89,240	119,811
First half 1900	114,177	20,400	134,577	43,153	90,747
Second half 1900	113,810	20,400	134,104	46,278	63,335
Total 1900	227,987	40,800	268,681	89,431	160,082
First half 1901	112,794	20,600	133,394	46,847	50,027
Second half 1901	110,561	21,300	131,861	53,394	44,339
Total 1901	223,355	41,900	265,255	100,241	94,366
First half 1902	117,748	22,700	140,448	52,546	97,960
July, 1902	22,749	4,000	26,749	9,210	11,733
August, 1902	23,196	*2,100	25,296	9,504	12,429
September, 1902	23,688	2,100	25,788	9,155	13,183

* The decrease in "Outside Sources" this month is caused by the largest of them becoming "Reporting Mines."

The American Spiral Pipe Works of Chicago, Ill., are now manufacturing spiral riveted steel pipe up to 32 inches in diameter and No. 8 gauge and lighter. It is believed that this is the largest and heaviest spiral riveted pipe ever made.

The New York Machinery Market.

NEW YORK, October 22, 1902.

General conditions in the machinery trade continue on a good basis, although the market was devoid of any extraordinary features during the last week. A little complaint is heard due to the closing down of some foundries which have been unable to obtain coke. These complaints are not numerous, however, as it is only the Western foundries that are affected so acutely. Eastern foundrymen are getting coke, even though they are compelled to pay fancy prices for it. There is not a shortage of coke; the trouble lies with the railroads, who are so short of locomotives that they cannot haul it rapidly enough to supply the demand. The railroads are working their locomotives so heavily that they are going to the repair shops in large numbers. The working capacity of the repair shops on all the railroads is being increased considerably at present, despite the large additions recently made. This feature of the present situation is productive of a good deal of nice business for machine tool builders. While certain machinery representatives who travel a good deal are complaining of a holding back of orders pending the resumption of a more natural state of affairs, others state that the shortages can only be taken as preceding another rush which they predict is sure to come soon.

The settlement of the coal strike, it is thought, will aid in bringing about an easier feeling all around. Although we have not heard of any machinery builders who have been forced to suspend operations due to the shortage of coal, there is a great amount of satisfaction expressed in the trade over the relaxation from the nervousness which was growing more intense in all quarters of trade. There is very little interest shown in the trade over the political situation, even though the Congressional election is only two weeks off. The few machinery merchants who do express an opinion on this subject seem to agree that it were better if more popular interest were shown.

In the machine tool district optimism is still uppermost. The action of the National Machine Tool Builders' Association in Cleveland last week, which was reported fully in the last issue of *The Iron Age*, is commented on in most favorable terms. The large machine tool merchants on Liberty street say that the builders cannot take a stand too firm to suit them. The more rigid the lines the better they will like it. One prominent dealer, who voiced the sentiment of the trade at large, said: "Nothing will please me more than to know that the machine tool builders will continue the good work that they have started. Their organization merits success, as it started in the right direction. Its members have stood apart too long and now that they have made so favorable a start I am anxious to see the members accept the benefits which they can derive by coming in closer touch with one another. Their stand for better prices is a good one and has proved to be not excessive, as orders are coming in at the new prices just as plentifully as they did prior to the advance. Everything that the association has done so far has tended to better the condition of business, to make the conditions under which we must do business more favorable. The action at the Cleveland meeting was all for the good. It is proper that the same rigidity of price which was established on the machines should be carried out on the attachments and accessories. The taking of a stand on the matter of terms, making them 30 days cash to all customers, is in the right direction. We would rather even see them on a basis of five days. We like to do business on a cash basis and, of course, the terms decided upon will make conditions better than they were when some of the manufacturers allowed long credits. The matter of consignments does not interest us under the new conditions, as with a fixed price we had no object in taking on large lots, as we formerly did. The association can continue its good work and I hope that it will do so and widen its scope as well by taking in new members."

A private cable received by a party in the trade yesterday stated that the German Reichstag had defeated the proposed new tariff measure. This action at least puts off a matter of considerable importance to American machinery in connection with future exportation to Germany. The next Reichstag will probably have the matter to deal with next year, but the opposition forces have evidently scored a point in favor of the American manufacturers. Charles A. Moore, of Manning, Maxwell & Moore, received an interesting letter from a Russian Government official, from which we are permitted to quoted the following: "Germany seems to be getting a lot of machine tool trade in this country that American manufacturers formerly had, due principally to the unfortunate tariff fight the United States and Russia got into over the sugar question. Dealers in St. Petersburg and Moscow tell me they cannot do much with American machinery any more and to protect themselves are pushing the sales of German goods. But if the new projected German tariff actually goes into effect in 1904, raising the duty among other things on Russian grain, it is an almost foregone conclusion that the American manufacturers will be able to recover lost ground if they are not too busy on domestic orders."

No purchases have been made as yet by the International Steam Pump Company on the large list of tools which they intend installing in their new "Snow" shops at Buffalo.

The Pennsylvania Steel Company of Steelton, Pa., who are building an extensive new plant for their "Bridge and Construction" department, will take up the subject of purchasing additional machinery in about a month. A large amount of machinery has already been purchased for this work, some of which has been delivered and is in operation and some being of special design is still under construction. The main building is being erected in three sections, two of which are now completed. The third will be started in a short time, and it is for the equipping of this section that the new machinery will be required. The new work in connection with the frog, switch and signal department of this company is not yet completed, and more machinery is soon to be purchased.

The crane order in connection with the new shops which the Pittsburgh & Lake Erie Railroad are building at McKees Rocks, Pa., has just been placed. It went to Manning, Maxwell & Moore and calls for five Shaw electric traveling cranes, as follows: One 20-ton, one 30-ton, one 16-ton, one 10-ton and one 7½-ton.

The International Steam Pump Company have placed an order with Beaman & Smith of Providence, R. I., for a 10-spindle multiple drill, which is to be operated in their Henry R. Worthington shops.

One of the largest orders for coal and ashes handling machinery ever placed in this market was just awarded to the Robins Conveying Belt Company of Park Row Building, New York. It was placed by the Interborough Rapid Transit Company, who have succeeded the Rapid Transit Subway Construction Company in equipping the New York Subway. The apparatus will handle all of the coal and ashes used in the great power station by belt system. There is to be a movable coal hoisting tower on the pier with conveyors running to the power house. There will also be elevating and distributing conveyors to the coal bunkers and an ash tramway running under the boiler room and to the pier coal tower, &c. The cars on this are to be handled by electric locomotives. A 1000-ton ash pocket will also be constructed on the pier.

Iron and Industrial Stocks.

Transactions in industrial stocks the past week have been quite heavy, as a result of the improved condition of the money market, and the settlement of the anthracite miners' strike. The stocks which were specially active were United States Steel, Republic, Tennessee Coal, Colorado Fuel, American Car & Foundry, Cambria, Pressed Steel and Locomotive. Fluctuations, however, were not wide in the case of any of these stocks. The highest prices were attained on Saturday and Monday. Since then a reaction has governed the market, due to the fear of gold exports.

We print elsewhere the official statement of the Standard Chain Company, who have decided to reduce their capital stock. This is the first, though probably not the last, instance of action of this kind in iron companies.

The Manufacturers Light & Heat Company of Pittsburgh, who recently increased their capital stock issue from $3,000,000 to $5,000,000, and plan to arrange soon for an authorized issue of $12,000,000, have purchased all the stock in the Tri-State Gas Company of West Virginia and the Wetzel Gas Company, also of West Virginia. The stock issue of the Tri-State Gas Company is $1,500,000 at par. Recently when the Manufacturers Company closed a deal in absorbing this and three other contemporaries they bought simply a controlling interest or 8000 of the 15,000 shares. At the same time a bare majority of the Wetzel Gas Company stock, amounting to $300,000, was purchased and the rest has just been taken up.

The stockholders of the Harbeson-Walker Refraction Company will vote on November 11 on the proposition to increase the capital stock from $25,350,000 to $27,600,000 by raising the preferred stock from $8,850,000 to $9,600,000, and the common stock from $16,500,000 to $18,000,000.

The stock of the Sharon Steel Company, Sharon, Pa., was quoted on the Pittsburgh Stock Exchange last week at 160 bid and 175 asked.

The Bucher & Gibbs Plow Company of Canton, Ohio, will increase their capital stock from $250,000 to $700,000.

The directors of the Manufacturers Light & Heat Company of Pittsburg last week increased the usual quarterly dividend of 2 per cent. by declaring an extra dividend of ½ per cent., placing the rate on a 10 per cent yearly basis. The Tri-State Gas Company, owned by the Manufacturers Light & Heat Company, also declared the regular quarterly dividend of 1 per cent. Both dividends were payable October 20.

The National Enameling & Stamping Company have declared the regular annual dividend of 7 per cent. on the preferred stock, payable in quarterly installments of 1¾ per cent. each on January 1, April 1, July 1, October 1, 1903, and an annual dividend of 4 per cent. on the common stock payable quarterly 1 per cent. each on January 1, April 1, July 1, October 1, 1903.

German Iron and Steel Trade.

BERLIN, October 8, 1902.

At present the demand in the Iron market looks satisfactory, but this is not sufficient to create the desirable steadiness of prices. The works, after all, are in want of orders, and in order to obtain what they can get they are disposed to allow lower prices. The main object they have in view is to keep their business going on almost any condition. Things are not the same all around. Those concerns who are supplied with machines and appliances of the best sort and up to date are in a better position than others; they do their trade at reduced cost and are enabled to take in orders at a reduction of prices. Other concerns who have not kept pace with technical progress must either stop or do a losing business.

Complaint is general about the high prices of raw and partly manufactured materials. They are declared to be a stumbling block to trade and the main obstacle in the way to recovery. The great concerns, however, hold an exceptional position; they have managed to get the bulk of the whole Iron and Steel production in their hands and thereby are enabled to export a very important part of their surplus production at proportionately cheap prices. This allows them to keep their production at full rate and to keep all or nearly all their hands employed. But now we come to the reverse of the medal: A very large part of the Iron and Steel exported and sold abroad is made into manufactures, and in that state and form is sent forth to Germany. Here it depresses the market in many ways. Add to this that the great concerns export manufactures very cheaply, and that by so doing they kill the export business done by the smaller ones. Thus the latters' position is drifting from bad to worse and may become untenable.

Things are not at all rose colored, and the emphatic declamations against the "American Steel Trust" are pretty much out of date, since we observe the greater and stronger among the German concerns acting on the same lines or about so, only with the difference that the German system is deficient in greatness of conception and practice.

The latest market reports mention Pig Iron as listless. Yet the production is being sold, and stocks, except those with the furnaces, are getting smaller. The Steel works are busy in turning out partiy manufactured products in face of a demand which is described as "well sustained." The big rolling mills kill the business of the smaller ones through low prices, which the latter are unable to grant. The Wire trade complain, and on Wire Nails—a very important thing—prices are going down. The action of the United States Custom House authorities in taxing Billet imports from Germany according to their prices in the German market and not at the manifested export prices, which are much below the former, has been met with perfect composure by the trade, who seem to be of opinion that the increase of cost, $2.24 per ton, will be at the expense of the American buyer. But their newspapers have sounded a note of alarm. They ask for insertions in the new tariff, which is to come, to enable the Government to take measures of retaliation against such proceedings of other countries. One should not take these utterances in a very serious way. They are written and published by editors who draw liberal subventions from trade and who want to display zeal in the promotion and protection of what they opine to be the interests of trade. The great men in the trade are all men of business habits, and wish to avoid everything and every word which might afford the slightest offense to other countries. They know that trade is founded on calculation and not on measures. As to the "new tariff to come," it is much too early to offer an opinion as to what it will be, and what it may look like. Just now there is talk of dropping or postponing the tariff altogether and of reviewing the commercial treaties.

Proceeding from the details of the position, as it shows itself to-day, to the general lines of German trade, we see that the depression has wrought intense effects. Before the year 1900 there was bustle all round, no limits, no moderation to enterprise. "If the sky falls all the little larks will be killed." It was on the "jolly" motto that trade and financiers have acted, waiving all objections presented by thoughtful parties. Now, after the blow has come, there is a thorough change, which is manifested by the decline in the number and importance of new companies founded.

The statistics show that new companies were founded in the past three and a half years as follows:

	1899.		1900.		1901.		First half 1902.	
	Number.	*Capital.	Number.	*Capital.	Number.	*Capital.	Number.	*Capital.
Coal (and salt) mining trade	11	23,349	14	23,219	7	11,300	1	1,500
Metal trade and machines	75	109,220	53	87,390	19	19,010	4	2,935

* 1000 marks.

These figures are eloquent in demonstrating the danger in business and the decline.

Things are particularly bad in the Iron and Machine trade, where the inconsiderate increase in the number of concerns, the foundation of new companies and the inflation of production inseparable from such proceedings led at times to reckless competition which could not fail to work havoc.

Foreign trade movements were in favor of Germany, as follows:

		Exports. Tons.	Imports. Tons.
Pig and Scrap Iron	1900	191,000	827,000
	1901	304,000	294,000
Iron manufactures and half manufactures	1900	1,359,000	157,000
	1901	2,044,000	197,000

There is indeed a great balance to the benefit of Germany, but it is no "unmixed blessing," because the evolution is founded on the policy of the syndicates to export at prices far below those in the home market.

As to the value of exports, the object, which is here to show the drift and effect of the movement, will be amply attained by giving the figures representing the sums by which exports were in excess of imports:

	Millions of marks.									
	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.
Coal	40	45	41	44	60	67	90	95	82	117
Ordinary Iron goods	54	59	61	73	85	91	114	122	120	131
Rails	9	7	9	10	12	11	13	13	19	20
Wire Nails	7.5	8.2	8.2	9.2	8.7	7.7	7.1	9.1	9.8	8.7
Plates	9.4	9.5	10.5	15.1	17.2	18.4	21.4	23.7	27.7	32.2
Tubes	3.8	4.7	5.2	5.9	4.6	3.8	7.7	2.7	4.9	7.3
Machines	35	37	57	60	72	83	92	120	127	136

The total exports amounted in 1901 as follows:

	Millions of marks.	Per cent. of total exports.
Great Britain	916.4	20.3
Austria-Hungary	491.5	10.9
United States	385.8	8.5
Netherlands	379.0	8.4
Russia	345.9	7.7
Switzerland	264.3	5.9
France	249.9	5.6
Belgium	236.0	5.2
Italy	127.0	2.8
	3,395.8	75.3
All other countries	1,116.8	24.7
	4,512.6	100.0

Besides Austria-Hungary, whose position is exceptional, the greatest share is held by England and the United States, and much of the export to Holland goes further on to the United States.

Prices in the home market show the following record as to January prices in Rheinland-Westphalia:

	Marks per ton.									
	1886.	1890.	1894.	1896.	1897.	1898.	1899.	1900.	1901.	Dec. 1901.
Puddled Pig	41	90	45	49	57	59	59	79	85	60
Foundry Pig	55	91	62	65	67	67	69	93	93	65
Bar Iron	102	187	95	108	127	123	138	215	130	85
Boiler Plate	143	260	120	125	138	138	143	212	200	160
Rolled Wire	110	180	93	105	122	123	125	185	150	90
Steel Rails	137	165	110	110	118	118	125	155	120	95

The profits earned by the companies in the trade and distributed among shareholders are on record as under in percentages:

	1899.	1900.	1901.
Mining companies	11.95	13.14	9.38
Metal trades	8.13	9.14	6.72
Makers of railway material and machines	12.13	11.06	6.11

The decline is obvious. How this decline in the companies' profits is interpreted in the stock market the following table will show. I give you a list of some prominent companies and the quotations of new shares in the market:

Iron companies.	Highest quotations. 1893-99.	August, 1902.	Dividends distributed. 1899. Per cent.	1900. Per cent.
Barop Walzwerk	256	113.80	15	0
Bismarck Hütte	350	211.12	24	12
Bochumer Verein	287½	179.20	16 2-3	13 1-3
Dortmund Union	149¾	44	7	0
Düsseldorf Eisen w. Draht, preferred shares	178	59.50	11	0
Eschwerter Eisenw	276	109	22½	0
Hasper Werk	455	144	30	0
Hoerder Verein	234½	108.70	14	10
Hoesch	257.10	139.60	16	10
Huldschinsky	192	101	12	4
Laura Hütte	284	191.60	16	14
Mannstaedt Façon	391¾	117.60	35	0
Westfäl. Stahlwerke	261¾	120.75	17	0
Braunschweig Machines	230	108¼	18	20
Chemnitz Werkzeug	223	115	10	3
Düsseldorf Maschinen	220	80½	16	16
Egestorff Maschinen	424	302½	28	28
Hartmann Maschinen	202½	124.60	9	6
Herbrand Waggon	202	93¾	12	5
Kerchner & Co	280	81	14	0
Ludw. Loewe & Co	505	230	24	24
Märkische Maschinen	185	85	12	2
Orenstein & Koppel	270	123.90	20	10
Rheinische Metallwaaren	234¾	59.75	14	6
Schwartzkopf	275½	179½	13	10
Sentker	215½	...	12½	4½
Ver. Kammer' Werke	325½	...	15	0

The decline and in many cases the disappearance altogether of profits or dividends strikes the eye and speaks volumes. The falling off in the market prices is the result and illustrates with singular force and eloquence the depression. The question what to do absorbs business men and national economists alike—viz., What will the future bring?

Even under the present rate of exports to the United States the position in the Iron trade and in the Coal trade would be well nigh untenable if it were not for the regulations, work and influence of the Pig Iron syndicate and the Coal syndicate. They keep the prices of the indispensable raw material which they command high, and even higher than they ought to, for by so doing they prevent the trade depression from progressing at a quicker rate, but in any case they act as a regulator in the market and keep it aloof from a reckless and a ruinous competition.

Now it is by no means certain that the Pig Iron syndicate and the Coal syndicate will be renewed. If not, the markets may be soon upset to a degree scarcely imaginable. It is this, and perhaps only this, disquieting prospect on which the opinion is founded that the syndicates will be renewed. The question of the syndicates is being closely studied. The Imperial Government has ordered an inquiry into these organizations and their effects. The trades themselves are prepared to defend the syndicates against parliamentary and legislatory enmities and interferences. France has sent M. Sayon, professor of national economy, to Berlin to study the question.

It appears that efforts are on foot by which it is intended to reform the syndicates and to extend most reformed syndicates to many other branches of trade, charging them with the duty to publish at short and regular intervals statistics of production on the model of harvest reports. The promoters of the plan hope that it will be able to prevent overproduction and keep trade at a regular price.

Much is said about the "American danger," to use the expression which has become popular. One of the leading representatives of the trade, the "Verein für die bergbaulichen Interessen im Oberbergamts-Bezirk Dortmund" (which long title means a sort of chamber of commerce attending to the interests of mining in Rheinland), speaks in an official publication of the "American danger" as of a thing possible. It may come in case the shipbuilders in the United States obtain the high bounties proposed for new ships. In this case, the opinion says, American Iron, Steel and Coal may overrun the German market, but up to the present time the question is more talked about than it is investigated and considered.

Other men say that there is no danger of an invasion of American Iron, Steel and Coal, provided Germany attends to efficient railway freight reductions within her borders and supplements cheap railway freights by building canals to afford cheap water freights. The keen interest in watching the course of events in America is partly due to an idea that eventually America will throw her surplus production of Iron and Steel to Europe.

Trade Publications.

The Machine Tool Vises made by the Baird Machine Company of Oakville, Conn., can be used on milling machines, planers or upright drills. They are furnished with steel jaws, which are case hardened when required, and are recessed on either side for clamps or straps. The No. 3 size has a width of jaw of 5¾ inches, depth of jaw of 2 inches, and the jaws open 5 inches.

Hydraulic Tools and Machinery.—R. D. Wood & Co. of Philadelphia have prepared an elaborate catalogue dealing with their hydraulic tools, cranes and machinery. Their quadruple hydraulic forging press is intended for general use and die work. The base pressure brings the moving platen down on the work, when the intensifier is operated to complete the stroke, which is adjustable. A range of four pressures may be brought on the work. The hydraulic flanging and cold plate bending press is specially designed for work in shipyards, pressed steel car works, &c. It is also serviceable for special flanging, forming and bending. It is provided with a clamping bar of liberal capacity actuated by two independent hydraulic cylinders. Their hydraulic hinged and parallel types of portable riveters are of special utility for riveting in places difficult of access. These tools are frequently selected for general work as they cover a wide range. The hinged type are not made of less or the parallel type of more than 36-inch gap. The effect of the arc in the hinged machine becomes objectionable on short gaps. This is obviated in the parallel type, a design not adapted to long gaps.

Tool Grinder.—A circular from the Diamond Machine Company of Providence, R. I., describes the improvements made in their No. 2 tool grinding machine. Particular attention is called to the pump, which is of new design, mechanically simple and powerful, with the least number of wearing parts. The machines are furnished with or without a truing device, but its use is recommended, as it is always ready for immediate use, and with it the wheel can easily be kept in perfect condition. The diameter of the spindle and the size of the bearings are larger than in earlier machines. The bearings are babbitted and provided with ring oilers.

Republic Iron & Steel Products.—An exceptionally valuable trade publication has just been issued by the Republic Iron & Steel Company of Chicago. It is termed a catalogue, but it will be used as a work of reference much more than merely as a catalogue of the company's products. It comprises 250 pages, is of pocket size, bound in limp leather covers and is provided with a handy marginal index. The standard lists and classifications of iron and steel are given a conspicuous place, followed by standard specifications. An enumeration of sizes made by the company fills several pages. Such specialties as turnbuckles, harrow teeth, spikes, splices, bolts and nuts are accorded generous treatment. Tables of weights of all forms of iron and steel are given, which cover numerous pages and are always of great use. A special feature, however, is the presentation of tables often desired but seldom found in a book of this character, such as net ton prices with gross ton equivalents, percentages of a gross ton in pounds, tons of 2240 pounds shown in pounds, and tons of 2268 pounds shown in pounds. Lithographs of special shapes and sections made by the company fill 88 pages, and comprise angles, tees, channels, zees, implement shapes and special sections. A very complete index is found at the end of the book, taking six pages. The annual capacity of the company's works is stated to be 1,000,000 tons of finished products.

Pipe Unions.—The union made by the E. M. Dart Mfg. Company of Providence is one of the most effectual appliances for connecting pipe. These unions are made of malleable iron, plain or galvanized, with seats of bronze fitted and ground to a ball joint. The principle of a ground union as manufactured by the company is to force bronze rings into recesses bored and faced to receive them in both ends of the union. The concave and convex ends are turned and fitted together to a true arc with ground joints. This construction does away with the necessity of packing. The pipe ends and nut, combined with the bronze seats, are extra heavy, making a very strong fitting adapted to every requirement of a union.

Fire Hydrants.—We have received from the Coffin Valve Company of Neponset, Boston, Mass., a pamphlet describing their Walker fire hydrant. In this hydrant the valve opens downward, leaving an unobstructed waterway. The operating rod cannot buckle and the valve cannot chafe the seat. In their rubber faced fire hydrant the valve is provided with a removable rubber face, so that sediment between the valve faces will not scratch and cause leaks. There are two distinct motions of the valve in opening—first away from the seat horizontally, then down out of the waterway. The valve, rod and waste are all in one section, so that a simple lift brings all parts out at the top.

PERSONAL

The Board of Directors of the Westinghouse Air Brake Company of Pittsburgh have made some important changes in the official make up of the company since the annual meeting held last week. The changes follow: W. W. Card, who was formerly secretary and assistant treasurer, has been made third vice-president, a new position just created; John F. Miller, formerly assistant secretary, becomes secretary; E. A. Craig, formerly assistant auditor, becomes auditor, and R. F. Emery is advanced from general bookkeeper to assistant auditor.

James Dillon, formerly assistant superintendent of the welding department of the National Tube Works at McKeesport, has resigned. He has been elected superintendent of the new Lake Erie Tube Company at Buffalo and expects to assume charge of that plant about November 1.

General Manager H. H. Campbell of the Pennsylvania Steel Company returned this week from a vacation spent in the Maine woods.

A. J. Hughes and A. S. While of Hughesoffska have returned to Russia.

E. W. Parker of the United States Geological Survey has been appointed by President Roosevelt as one of the commission of arbitration in the coal strike.

At the forthcoming convention of the American Bankers' Association at New Orleans William B. Ridgely, Comptroller of the Currency, will deliver an address on "Changes in Banking Conditions."

A. E. Harper, who was fuel agent of the Illinois Steel Company for 12 years, has been appointed vice-

president and general manager of the Manufacturers Coal & Coke Company, with headquarters at Connelsville, Mo.

W. C. Johnston, formerly manager of Sligo Rolling Mills of Phillips, Nimick & Co., at Pittsburgh, has taken charge of the chain department of the Monongahela Iron & Steel Company at Hays Station, near Pittsburgh.

C. H. Halcomb, formerly president of the Crucible Steel Company of America, and who bought some months since a large site of land in the East End, Pittsburgh, on which he proposed to build a residence, has resold the property.

Dr. G. Revay, formerly of Cleveland, Ohio, has returned from a six months' visit in Europe to establish himself as consulting engineer at 45 Cedar street, New York. Dr. Revay will take up coke manufacture, metallurgical work and chemical manufactures.

Edward W. Parker, managing editor of the *Engineering and Mining Journal* for the past year, has resigned that position, believing that connection with any journal might prove embarrassing in the discharge of his duties as a member of the anthracite mining commission.

Among the recent arrivals from Europe those connected with the iron interests are Walter Wood of R. D. Wood & Co., Andrew Wheeler, Jr., of Morris, Wheeler & Co., and Justice Cox, Jr., of Justice Cox, Jr., & Co., Limited, all of Philadelphia.

Another Possible Ore Road for Pittsburgh.

PITTSBURGH, PA., October 22, 1902.—About a year ago Jones & Laughlins, Limited, of the American Iron & Steel Works, had preliminary surveys made for the building of a railroad from Lake Erie to Conneaut, with their Monongahela connection at Pittsburgh. The idea of the company was to have their own ore carrying road in much the same way as the Bessemer Railroad serves the Carnegie Steel Company. Recently the Jones & Laughlin Steel Company have taken this matter up, and while nothing official has been given out there is a strong possibility that the road will be built. In addition to the Jones & Laughlin Steel Company being interested in the new project, it is stated unofficially that the Union Steel Company, now building large blast furnaces and steel works at Donora, Pa., are also actively identified with it. The first real work toward consummation of the project was the purchase the other day of a large site of land near Erie by the Mellon interests, who are largely interested in the Union Steel Company, which it is proposed to utilize for the building of the large ore docks. The charter of the Jones & Laughlin Steel Company, who very recently succeeded Jones & Laughlins, Limited, does not permit the corporation to construct, own or operate railroads. Inasmuch as the projected line will cross portions of both Pennsylvania and Ohio, this will necessitate the organization of two companies, one for the building and operation of the road in Pennsylvania and the other for the building and operation of the line in Ohio. The third corporation that is likely to be created is for the ownership and operation of the docks and terminal facilities near the mouth of Elk Creek, Erie County. As announced, 2500 acres of valuable land frontage was secured by A. W. & R. B. Mellon near Girard, Pa., and they have thereby obtained practically the only unoccupied harbor site between Cleveland and Buffalo. It is this site which carried with it in its transfer the charter of the Lake Erie Terminal Railroad running from the dock site to Albion, where connections are possible with the Lake Shore & Michigan Southern, the Bessemer & Lake Erie and the New York, Chicago & St. Louis or Nickel Plate railroads that is to be the lake terminus of the new ore line. The new railroad will probably be known as the Pittsburgh, Niles & Western. Its local connection will be the Monongahela Connecting Railroad, the present terminal line of the Jones & Laughlin Steel Company. This line now extends to coal properties of the company back of Homestead and Hay's Station.

To reach the new line a tunnel will be constructed through the hills on the south side of the Monongahela River, and the projected road will actually begin near Carnegie. It will then run northwest until it strikes Raccoon Run on the south side of Beaver County. It will follow this stream to the Ohio River near Smith's Ferry, where a bridge is to be built. At Smith's Ferry it will take to the valley of the Little Beaver, which it will follow into Ohio passing west of Poland, Youngstown and Girard. It will cross the Mahoning Valley at Niles and run northward to Jefferson, Ashtabula County, Ohio. There it will turn to the east and crossing Mill Creek will return northwest to Girard. The total length of the road will be a little more than 125 miles. The grades found by the surveying parties, who have been in the field for some months, are excellent. It is believed that the road can be built without striking a grade greater than 1 per cent. at any place. Officials of the Jones & Laughlin Steel Company and the Union Steel Company refuse to state to what extent these companies are interested in the projected road. The only official statement so far given out was a short one by the Jones & Laughlin Steel Company, which reads as follows: "The report that the Jones & Laughlin Steel Company are interested in the new line to Lake Erie is mainly correct, although the information did not come from this office. The company, however, do not contemplate building furnaces or mills outside of Pittsburgh."

The Duty on Steel Billets.

Colonel Jewell, the appraiser who has charge of the questions which have arisen about the duty on steel billets, is not expected to return to New York until Thursday, so that no decision will be announced until after that day. In the meantime there has been a largely attended meeting of importers and consumers of steel billets in this city on Friday last, at which steps were taken to secure accurate information concerning the German home market prices for steel. The importers have not kept closely informed on this point because the German domestic prices possessed no apparent interest for them. It is understood that the Government officials sent for specific information from consuls in Germany early in September, but that as yet no replies have come to hand.

Yesterday at Philadelphia an invoice of steel billets was passed by the local appraiser at the old rate of duty of $6.72 per gross ton. This was, however, due to the fact that the importers placed on the steel the valuation of 92.50 marks per 1000 kg., which is below the 1 cent per pound rate.

One extraordinary point has come up in connection with this matter. An invoice of 1,536,306 pounds of steel blooms was assessed at 0.3 cent per pound, or $6.72 per ton, making the duty $4608.92. The steel had been invoiced at 74 marks. This was raised to 87.50 marks, which kept it below the limit for an advance in the duty, which was assessed, as stated, at the old rate. But the increase in the valuation imposed upon the importer a penal duty on an undervaluation of about 18 per cent., adding $2612.16. In other words, a penal duty was put on in spite of the fact that the change in valuation did not at all affect the rate of duty.

The extent of the penal duties may be judged from two invoices, aggregating 502 metric tons. The valuation on these billets was raised from 76.36 marks to 97 marks, an advance of 27 per cent., which led to a penal duty of $3139.56, or over $6 per ton. In view of the fact that some shipments had been invoiced as low as 65 marks it will be readily understood that the case cited is not by any means an extreme one.

A Steel Rail Record.—The Ohio Steel Works, at Youngstown, one of the constituent companies of the United States Steel Corporation, was put on steel rails in the spring of the current year. Its tonnage has steadily increased, and on October 7 a new record was made, the mill rolling in 24 hours 2229 gross tons of steel rails.

HARDWARE.

THE announcement of the important reduction to be made November 15 in the price of Shovels and Spades, in accordance with the decision reached and the policy adopted by the associated manufacturers, is a matter of engrossing interest to the trade in all parts of the country. The goods affected are among the most staple in the whole Hardware field, having place in practically every Hardware establishment and every country store in the land. Any change in the price of such a leading line would command attention, but in this case the action taken is of so radical a nature and the decline in prices is so marked that its announcement causes a sensation in the trade, recalling the effect produced some years ago by a sudden and deep cut in the price of Nails. An abrupt decline of about 33 1-3 per cent. in the price of the common fourth grade plain back Shovel is in itself sufficient to attract the attention of the trade in an unusual degree, but apart from the change in price the action will generally be regarded as important from the fact that it is indicative of the demoralized condition which prevails in the Shovel market and the intensity of the competition which characterizes it. The future course of the market will be watched with solicitude, but its demoralization is a matter for regret and is detrimental to the interests of the trade.

The condition of the Shovel market furnishes an impressive example of the failure of attempts to control and monopolize the manufacture of a staple line. The association began with an organization which included practically every manufacturer in the country, and for a time succeeded in maintaining its control of the market. This was done very largely by purchasing or subsidizing competing plants as fast as they became formidable, while at the same time the establishment of such plants was hedged about with difficulties. It was, of course, impossible that this policy, which called for the expenditure of large sums of money, should be indefinitely continued, but it was adhered to until the number of concerns which were bought out or subsidized at least equaled the number of houses represented in the association, while at the present time there are as many more independent manufacturers with whom no terms have been made and who are now actively in the field with a more or less complete line of goods. During these efforts on the one hand to keep control of the market, and on the other to obtain a foothold in it, the prices established by the association were sufficiently high to present an inducement to capital and enterprise. The competition which exists has thus been encouraged and the results which confront the trade to-day might have been anticipated from the outset. A new illustration is thus given of the effect of combinations and pools in increasing competition and inducing demoralized conditions, especially when in connection with the attempt to prevent competition there is at the same time the maintenance of high prices which invite it. What the end will be remains to be seen. The reduction in price is apparently an effort to drive the outside manufacturers from the field, and prices, especially in competitive goods, have been put at so low a figure as to be unprofitable except to manufacturers having facilities which permit their production at a minimum of cost. Some of the outsiders are apparently well equipped and do not indicate a disposition to give up without a contest.

The suggestion has been made by both manufacturers and jobbers who do not, we are sure, represent in this the judgment of either of these great classes, that *The Iron Age* withhold information from the trade at large in regard to the announced reduction in the price of Shovels. The reason assigned for this strange suggestion is the fact that in this way an opportunity would be given to merchants who have a supply of the goods on hand to reduce their stock and possibly clean it out altogether before the new prices go into effect. It is needless to say that such a withholding of trade information for such a purpose would be absolutely contrary to the principles on which *The Iron Age* is conducted, and would be an injustice to the great mass of the trade, who would be innocent purchasers of a line which is known by all well informed purchasers to be on the verge of a decline. In a matter of this kind the retailers' interests are as great and important as the jobbers', and the amount at stake is at least as large, although more widely distributed. There is for both classes of distributers the unpleasant necessity of facing an abrupt reduction in the market value of a portion of their stock, and the one class as much as the other is entitled to the benefit of the knowledge of the actual state of the market in which the impending reduction is a fundamental feature. The publicity, too, which has been given to the coming change in price through the circulars of manufacturers announcing it, which went to every jobbing house and to many retail merchants, has brought the matter to the attention of all who are in close touch with the market, and the news has doubtless been carried far and wide through other channels, so that it will be known to many of our readers before they see the matter brought to light in our columns. The manufacturers possibly had some good reason for making the coming change known so long in advance of the time it goes into effect, but the trade who have been purchasing with confidence in the strength of the Shovel market are unable to understand it.

Condition of Trade.

There is a steady and large movement of goods throughout the trade generally, manufacturers, jobbers and retail merchants having each their share in the active business which is doing. Many lines are in short supply and much time is consumed in efforts to hurry up shipments. Stocks throughout the country are generally good, the policy of the merchants having been to purchase liberally in view of the prosperous conditions which prevail and the steady tone of the market. Factories continue to be embarrassed by difficulty in obtaining fuel, and the high prices ruling in some sections give slightly increased costs. The congested condition of the railroads and delays in transportation are also factors in the situation. The principal topic in the Hardware trade this week is the announced reduction in the price of Shovels, which is referred to at length in another column. Manufacturers, with scarcely an exception, are crowded with orders, and in many goods are running their factories overtime. The declines, which we are called upon to chronicle from time to time, are apparently accepted by the trade without much disturbance in the general feeling or diminishing the volume of business. The desirability of having goods which are too high brought down to a proper level is generally acknowledged, notwithstanding the fact that the transition is an unpleasant experience.

Chicago.

(By Telegraph.)

The Hardware jobbers report no change of importance in the volume of demand and present active conditions show no signs of abatement. All prominent in the trade share alike in the opinion that the late fall trade will be in very heavy volume this year, as some considerable business which is bound to come from the agricultural districts is being delayed owing to the lateness in the harvesting of the crops. Hard Coal Stoves and Ranges this season are rather a drug on the market owing to the coal strike and those who are carrying stocks of this particular line of goods report a very limited demand, but on the contrary all Soft Coal and Wood Burners, as well as Oil, Gasoline and Gas Stoves, have been in unusual demand. Among the particularly active selling goods for the forthcoming holiday trade Pocket and Table Cutlery seem to be feeling the strongest share of this demand. This department in the jobbers' establishments is compelled to work overtime in order to keep pace with the volume of trade. The new schedule of prices adopted by the Shovel Association is current in the trade and is the topic of some discussion. Shelf and Builders' Hardware is on the active list. Some local jobbers of Hardware note that, notwithstanding the unsettled prices, there have been distributed during the past few months Shovels, Spades and Scoops in much larger number than during any previous time. The adjustment of prices by the combined manufacturers—even though a lower level has been made—is regarded by the trade as needful and satisfactory and a larger distribution of such goods is now predicted. The demand for nearly all kinds of Cutlery is reported to be active, some jobbers having experienced the largest trade in their history during the past month. The demand for Stove Pipe, Elbows, Enameled Ware and other Kitchen Utensils has continued quite active and liberal shipments have been made of such goods to the country trade during the past ten days. The largest manufacturers of Nails, Wire and Wire Goods report liberal sales and an active movement, the conviction prevailing that bottom prices have been reached stimulating purchases. On the other hand independent manufacturers are not inviting business at the prices current, although they are taking business to a moderate extent for prompt delivery. Several large orders have been taken by manufacturers of Builders' Hardware for next year's delivery, but the bulk of the business is confined to contracts for this fall and business of this character has improved somewhat, although the disposition on the part of jobbers to purchase only in small quantities, anticipating a decline, is evident. On the other hand manufacturers are selling at less margin probably than ever before and anticipate an appreciation in the selling prices, based upon the increased cost of production resulting from the higher prices of raw material and labor. The demand for Edged Tools and heavy Steel Goods has continued on a liberal scale, and some few additional orders have been placed for Hoes, Rakes and other small Agricultural Implements. The call for Heavy Hardware has been less active and prices have been less strong, there being less disposition to demand premiums than was the case a month or six weeks since.

St. Louis

(By Telegraph.)

The volume of requirements from local and outside sources is often a difficult task for the jobber to supply promptly on account of the slowness in coming forward from the manufacturer of certain specifications in these goods. Collections generally are reported as being good.

NOTES ON PRICES.

Wire Nails.—With more confidence in the stability of the market, together with the larger demand for Nails incident to the season, an increased activity is shown. The regular quotations are as follows: Carload lots or mixed carloads, $1.85 to $1.90; less than carloads, $1.95, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days. For galvanizing Nails 75 cents per keg extra is charged and for tinning Nails the extra per keg is $1.50.

New York.—The temporary lull in orders from the trade in this territory, resulting from the uncertainty caused by the reduction in prices, is now causing an increase in business, with demands for prompt delivery. Quotations are as follows: Single carloads, $2.05; small lots from store, $2.10 to $2.15.

Chicago, by Telegraph.—The combination manufacturers have continued to make liberal shipments on old contracts and have secured further appreciable business for early delivery. The independent mills, however, are making but little effort to extend trade beyond taking care of previous customers. The jobbing trade has shown a steadier feeling, with a fair demand, and sales made mainly on the basis of $2 in carload lots, and $2.10 in less than carload lots, Chicago.

St. Louis, by Telegraph.—Wire Nails are in moderate demand at this time and in small lots from store $2.15 is the general quotation.

Pittsburgh.—The general condition of the Wire Nail market is more satisfactory than for some time. The tone of the market is firm and demand has shown some improvement. Specifications on contracts are coming forward quite freely and we are advised that prices recently fixed are being firmly maintained. We quote Wire Nails at $1.85 to $1.90 in carloads, and $1.95 in small lots, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days. For galvanizing Nails 75 cents per keg extra is charged and for tinning Nails $1.50 per keg extra.

Cut Nails.—At the meeting of the Cut Nail Association held on the 16th inst. prices for October were reaffirmed for the month of November. The unanimous opinion of the manufacturers was that the price of Cut Nails should be commensurate with the cost of manufacture, without regard to price of Wire Nails. Production at the present rate about keeps pace with demand. Quotations are as follows: $2.05, base, in carloads, and $2.10 in less than carloads, f.o.b. Pittsburgh, plus freight in Tube Rate Book to point of destination; terms 60 days, less 2 per cent. off in 10 days.

New York.—The difference in the proportionate cost of Cut and Wire Nails, which has been continued by the reaffirming of prices of the former for the month of November, has apparently had no detrimental effect upon the local demand for Cut Nails. Quotations for carloads and less than carloads are as follows:

Carloads on dock	$2.18
Less than carloads on dock	2.23
Small lots from store	2.30

Chicago, by Telegraph.—There has been a moderate movement, mainly in a jobbing way. The market has remained steady on the basis of $2.10 to $2.15 in carload lots, and $2.20 to $2.25 for less than carload lots, base, Chicago.

St. Louis, by Telegrah.—A fair business is being done through the jobbing trade for Cut Nails, and in small lots from stock $2.30 is quoted.

Pittsburgh.—The Cut Nail Manufacturers' Association met on Thursday, October 16, and reaffirmed October prices for November shipment. The manufacturers decided that in view of the high prices for Steel a reduction in Cut Nails was not justifiable at this time. Demand for Cut Nails is reported to be quite satisfactory, and there is still some difficulty in getting prompt shipments, owing to scarcity of Steel and also lack of cars and motive power. Iron Cut Nails command from 10 to 15 cents advance over Steel. We quote Steel Cut Nails as follows: $2.05, base, in carloads, and $2.10 in less than carloads, plus freight in Tube Rate Book to point of destination, terms 60 days, less 2 per cent. off in 10 days.

Barb Wire.—The quantity of Barb Wire being ordered is about the same as before the reduction in price was made. Quotations are as follows: Painted, in carloads, $2.15 to $2.20; Galvanized, $2.45 to $2.50; less than carloads, Painted, $2.20 to $2.30; Galvanized, $2.50 to

$2.60, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days.

Chicago, by Telegraph.—The consolidated manufacturers have continued to receive liberal orders and have made increased shipments on recent contracts. The jobbing demand has been without improvement, but the market has remained steady, with sales of Galvanized at $2.60 in carload lots and $2.70 in less than carload lots, and Painted at $2.30 in carload lots and $2.40 in less than carload lots, Chicago.

St. Louis, by Telegraph.—Considering the lateness of the season the volume of demand for Barb Wire is said to be good. In small lots from jobbers' stock Painted is quoted at $2.50 and Galvanized $2.80.

Pittsburgh.—The market is quiet, and the recent reduction in prices does not seem to have improved demand to any extent. The tone of the market is firm, and we are advised that prices are being firmly held. We quote as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount off for cash in 10 days: Painted, $2.15; Galvanized, $2.45, in carloads; less than carload lots, Painted, $2.20; Galvanized, $2.50.

Plain Wire.—The demand continues to show some improvement. The market shows firmness in tone. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. for cash in 10 days: Carloads, $1.80; less than carloads, $1.90. The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	Plain.	Add Galv.
6 to 9	Base.	$0.30
10	Advance over base	$0.05 .30
11	" " "	.10 .30
12 and 12½	" " "	.15 .30
13	" " "	.25 .30
14	" " "	.35 .30
15	" " "	.45 .60
16	" " "	.55 .60
17	" " "	.70 1.00
18	" " "	.85 1.00

Chicago, by Telegraph.—The mills report a fair volume of business and some little improvement has been noted in the jobbing trade. The market remains steady, with carload lots selling on the basis of $1.90, Chicago, and less than carload lots at $2 from store, Galvanized bringing 30 cents extra.

St. Louis, by Telegraph.—Jobbers report the trade for Plain Wire as being in very fair volume. Small lots from stock, No. 9, at $2.10 and Galvanized at $2.40.

Pittsburgh.—Demand is only fair, but the tone of the market is firm. A larger business is expected by the mills before long. We quote Plain Wire at $1.75 to $1.80, base, for Nos. 6 to 9; Galvanized, 30 cents extra for Nos. 6 to 14 and 60 cents extra for Nos. 15 and 16.

Shovels and Spades.—The trade have for some time been looking for developments in the Shovel market, in view of the rapidly increasing competition with which the association manufacturers are confronted. Their competitors for a long time were few and were putting on the market only a limited line of goods, but of late they have been increasing in number and in the extent of their products, so that several of them make practically a complete line, and with the inducements which they are making in the matter of prices have been able readily to dispose of all the goods they could turn out. Those who have watched the situation closely have wondered that the association found it practicable to maintain and even to advance prices as long as they did. The putting of the Bear grade on the market was one of the first acknowledgments of the recognized importance of the outside competition, the vitality of which was also illustrated by the promptness with which the independent makers put their competing animal brands on the market. At a recent meeting in this city the association, after a careful and protracted consideration of the matter, decided on a radical reduction in price, to go into effect November 15. Under date, October 14, circulars were sent out by some at least of the manufacturers, presumably to all their customers whether wholesale or retail, announcing that on November 15 a reduction in the price of their goods would be made and that discount sheets showing the reduced prices would be sent out at an early date. The manufacturers who have communicated with us on the subject intimate that their new schedule of prices has not yet been completed. Some information in regard to the prices has, however, been given out, and some of the main features of the new basis are disclosed. The reduction in price will affect practically the entire line, but will be most radical on those goods on which competition is troublesome. Thus, on the fourth grade Plain Back Polished No. 2 Shovel the reduction, rebates off, is $2 per dozen. It is intimated, however, that the rebate which is now in force will be largely reduced, some of the manufacturers intimating that it will be only 25 cents or possibly 50 cents. It is understood also that there will be no distinction in the price between Hollow Back and Back Strap Shovels. The new prices are recognized by manufacturers both inside and outside the association as pretty near to the actual cost of the goods to those who are favorably situated, and must be uncomfortably low to those whose facilities are not the best. In view of the condition of the Iron market and the higher prices ruling for Handles it is estimated in a general way that it costs about $1.25 more to make the common fourth grade goods now than it did some years ago when the association was formed, when, it will be remembered, very low prices were current. There is apparently a hard fight impending, as the independent makers will not yield without a struggle. Some of them express themselves as in a position to make goods at as low a cost as any of their competitors, but most of the associated manufacturers are splendidly equipped. The general methods of the association will remain substantially as they have been, the classified lists of houses on the basis of which prices have been graded being retained, but existing list prices will probably be discarded and net prices established which will be the basis of quotations, though lists subject to discounts may be used by manufacturers in announcing their prices to the different classes of trade. Some of these details are not as yet finally determined. It is understood, too, that there will be a reduction in the price of Snow Shovels, which will bring these goods to about the point at which they have been selling by outside manufacturers, who have been doing an active business in this line.

Cordage.—Some manufacturers of Rope are quoting guaranteed pure Manila on the basis of 12¾ cents per pound and guaranteed pure Sisal on a basis of 10¼ cents per pound. General quotations on other brands are 12¼ cents for Manila and 9¼ cents for Sisal, on a basis of 7-16-inch and larger. Demand is not heavy.

Glass.—The Glass factories throughout the country are now very generally in operation and the questions which have been annoying manufacturers have apparently been settled for the season of 1902-03. Indications point to a maintenance of fairly uniform prices by manufacturers. It is reported that the machine for making Glass with which the American Window Glass Company have been experimenting is a success, and that for some time Glass that has been made with the machine has been flattened, cut and packed and has proved superior to the hand made product. If this report is true the Window Glass industry is about to be revolutionized and the use of the machine in factories will no doubt become more general. Demand is very limited. The Jobbers' Association quotations are as follows for single and double strength Window Glass:

	Discount.
From store	88 and 5 %
F.o.b. factory, carload lots	89 and 5 %

Oils.—*Linseed Oil.*—On October 17 the price of City Raw Oil was reduced, in lots of five barrels or more, to 46 cents per gallon and in lots of less than five barrels to 47 cents per gallon. Out of town Raw is quoted at 44 cents in any quantity for immediate delivery. Demand for spot Oil is active, but on the declining market buyers are not anticipating their wants. While it is believed that prices have not reached their lowest point, it is natural to suppose that declines will be less frequent.

The Break in Shovel Prices.

WHAT THE JOBBING TRADE SAY.

WE give below extracts from letters and telegrams received from representative jobbing houses throughout the country in reply to an inquiry as to their views in regard to the important reduction in the price of Shovels announced by the associated manufacturers to go into effect November 15. These expressions of opinion are given without the names of the writers, some of whom prefer not to be quoted in the matter and thus become parties possibly to unpleasant controversy. We may add that the communications given are all from representative houses, some of whom occupy a commanding position in the trade. They may certainly be taken as representing the opinion of the jobbing trade in regard to the reduction in question:

From a Prominent Eastern House.

The associated Shovel manufacturers, commonly known as the Shovel Trust, at a very late day propose to do what they should have done, in our opinion, years ago. Had they at the start given the trade a line of goods at prices satisfactory to the consumer they would never have had the necessity of paying subsidies to new concerns and to-day there would be a great many less competitors in the field.

The trade who realize the worth of the best goods have never objected to paying reasonable prices for such established brands as O. Ames & Sons and Hussey, Binns & Co., but there was a great need for lower priced goods to supply those who cared more for the price than for the quality, and it was always a mistake that the Shovel manufacturers did not provide for this class of trade and by ignoring it allowed so many independent concerns to enter the market.

What the effect of these prices will be of course no one can say, but we do not suppose that any manufacturer can realize much profit on what are known as competitive grades.

From a Leading Western House.

We believe such a radical change in price is very detrimental to the retail Hardware merchant and jobber alike. It is inevitable under the recent conditions that have prevailed in the Shovel business. That it can be avoided is ably demonstrated by the sales policy of other consolidations.

From a Large House in Pennsylvania.

As to an expression of our views on the proposed Shovel reduction, we feel we must make our answer in two parts. First, as to the wisdom of the reduction.

Ever since the formation of the Shovel Trust we have been steadily opposed to their policy of high prices, believing it imposed an unrighteous tax upon the working people of the country. A tax or high price on Automobiles affects only those who are well able to stand it, but Shovels are articles of necessity and mainly bought by workingmen and farmers. Their high price has been an actual hardship, especially as the price has been pushed to such an extreme point that real value was entirely disregarded. It was a most arbitrary exercise of monopoly in its worst form, but the monopoly has had the usual result in developing such a number of competitors that it is now apparently working its own cure and hereafter competition will adjust the price naturally.

Secondly, we feel that the action of the manufacturers in announcing a decline in prices to take effect November 15 is most unwise and unfair to the dealer, and it is difficult to see what motives could have prompted its adoption. We can only assume that the association in adopting this course wished to make it appear that it was acting generously toward the trade, but as a matter of fact its action is simple selfishness. As it stands to-day, the jobber is simply compelled to anticipate the low prices announced for next month. In other words, all of his stock on hand has already depreciated heavily and any goods sold by the dealer between now and November 15 can only be sold on a practical guarantee of the prices ruling at that date. The jobber is obliged to buy the Shovels at to-day's prices, but in selling them he faces the probability of being compelled on November 15 to allow a reduction to the price ruling at that date on all goods sold in the interim.

If the manufacturers really desired to show some generosity the proper method, in our opinion, would have been to say nothing about the reduction until it actually occurred, and then rebate the dealers on the stock which they were compelled to buy at high prices and from the association only.

It always seemed to us sound reasoning that where an association or trust arbitrarily fixes the price and restricts the dealer to one source of supply the dealer is entitled to protection on his stock. Where the dealer can buy in the open market he pits his judgment and experience against the market conditions, but if deprived of these opportunities and compelled to buy only from one source he should be entitled to protection.

From an Illinois Jobbing House.

We believe the reduction in price will be beneficial, and that it should have been made a long time ago. We look for less irregularity of prices in this line than there has been for several years.

From an Enterprising Southern House.

The action of the Shovel Association in the proposed reduction of prices is no surprise to us, and in our judgment comes too late to check competition. Had this step been taken a year or more ago there would perhaps have been eight or ten less manufacturers in the field to-day.

There are a number of strong independent concerns who are able to hold their own in competition with the association manufacturers. They have been supplying the trade with perhaps the majority of the cheap and medium grade goods during the past year, and this competition has been keenly felt. Some of these independent concerns are now turning out first-class high grade goods, and their prices are materially lower than the association's. The proposed reduction will not be sufficient to meet the present prices of the independent manufacturers on certain grades. A large part of the trade do not entertain the kindest feeling for the association, and no doubt many of them have been glad of the opportunity to purchase their supplies from the independent manufacturers. The prices which have ruled for the past few years have been abnormally high, consequently competition has been invited and prices have been reduced from time to time by the independent people until the prices ruling at present are considered quite reasonable and just.

From One of the Largest Jobbing Houses in the Country.

After charging exorbitant prices as long as they could we are pleased to see that the manufacturers of Shovels have decided to sell them for about what they are worth.

From a Well-Known Eastern Jobber.

We consider that the manufacturers have made a very serious blunder in going at this in the manner in which they have done. We do not think it is treating their trade fairly. The manufacturers have been very slow in shipping their orders, and it was absolutely necessary for the jobbers to give specifications much in advance of their wants in order to have them on hand when wanted. If they had desired to do a thing of this kind we think it would have been better to give the jobbers as well as the retailers a chance to close out during the remainder of this year their stock before they were compelled to sacrifice such a large shrinkage in value. We wish to be put on record as severely criticising this method, which seems to be quite prevalent among some of the large corporations which are classified as trusts. We believe that if they are going to pursue such arbitrary methods it is high time that laws should be made to protect their patrons. If they are making such an enormous profit as their proceedings seem to prove, the sooner such organizations are done away with the better it will be for the public. They

will no doubt naturally say that this decline will not take place until November 15. Making a date and giving the actual figures as now is equivalent to an immediate decline in prices and there will be a general scramble to unload before the period specified.

We do not care to get into any controversy in regard to this matter, so, therefore, we beg to subscribe ourselves as jobbers who are very much against a proceeding of this kind.

From an Ohio Jobbing House.

The demoralization in price of Shovels is what we knew would come and we have been preparing for it for the past six months. We don't think merchants are heavily stocked. Had the reduction been made one month later it would have been better for both jobber and retailer.

From a Large Missouri Jobbing House.

Under prevailing conditions no other course was open to the Shovel Association. Their action is entirely satisfactory to this company.

From a New England House.

We do not care to have our name used in connection with any remarks that we may make, but the least we can say is we think the Shovel manufacturers have taken a most unusual and unbusinesslike method of announcing this decline, as it practically closes the Shovel business until after that date.

In the face of such a statement as they have made, jobbers everywhere will expect them to guarantee their stocks.

From One of the Largest Houses in the Northwest.

We consider that the reduction announced by Shovel Association has resulted from causes that should not have been permitted to exist.

From a Prominent House in the South.

We are opposed to all advances or declines not made in accordance with the laws of supply and demand.

From a Well-Known Jobber in New York State.

We consider the jobber distributing goods for manufacturers at prescribed prices should be protected to the extent of the reduction on the goods in stock at time of change, especially as factories have been recently filling orders held by them a long time.

There is no doubt that Shovels have been held too high in price for a long period, and under such conditions a reduction is the inevitable result.

From One of the Largest Jobbers in the South.

We consider the action of the Shovel Association unwise and arbitrary.

From a Well-Known House in the Middle West.

We regard the last move of the Shovel manufacturers in keeping with the unwisdom that has characterized the Shovel Association during its entire existence. We believe jobbers generally agree that for some years Shovels have been the most unsatisfactory line of all.

FREIGHT RATE REDUCTIONS, CHICAGO TO MISSOURI RIVER POINTS.

THE railroads operating from Chicago to Mississippi and Missouri river points have reduced their rates on manufactures of iron and steel in accordance with the request of Hardwaremen located at such points as Kansas City, St. Joseph, Wichita, Atchison, Topeka, Leavenworth, Omaha, Council Bluffs, Sioux City, &c., who met at the Coates House, Kansas City, the middle of September to protest against the prohibitive freight rates left in force after the trunk lines had cut the fifth-class rate, Western classification, to Denver and Colorado common points from 77 cents per 100 pounds to 27 cents. With the old rate still exacted from Chicago and St. Louis to the Missouri River cities, such rate being identical with rate from Chicago and St. Louis to Denver and Colorado common points, it is plain there was no opportunity for trade between jobbers on the Missouri River and their customers in Colorado if the latter could handle a carload of anything (the changes in any case not concerning less than carload lots), for the reason that the Missouri River wholesaler paid as much freight on his goods from St. Louis and Chicago as his customers did. Now the Chicago-Omaha railroads have made the rate from Chicago to Sioux City, Omaha, Kansas City and intervening territory 15 cents per 100 instead of 27 cents as heretofore, the rate asked for being 12 cents. The compromise was accepted, however, as there was no alternative. The roads also made a 10-cent rate to all Mississipi River points and a 13-cent rate to Des Moines, Fort Dodge, Cedar Falls, Marshalltown, Waterloo and adjacent territory. Among the products favorably affected in all the reductions are Nails, Bolts and Nuts, Bar and Sheet Iron, Structural Material, Agricultural Implements, Wire, &c.

THE NATIONAL HARDWARE ASSOCIATION.

THE detailed programme for the approaching annual meeting of the National Hardware Association has not yet been determined, but an outline of the work has been prepared from which it appears that the opening session will be called to order at 9.30 on Wednesday morning, November 19. The initial session will be of an open character, and participated in by members, manufacturers and other visitors. The afternoon session at 2.30 will be of an executive nature. Another executive session will be held on Thursday forenoon. There will be no session in the afternoon, which will be occupied by the delegates and their guests in a river excursion and visit to a well-known sugar plantation. Business matters will again receive attention in the evening, when an executive session will be held for the purpose of discussing suggestions and recommendations from the American Hardware Manufacturers' Association, who will be holding their annual meeting in New Orleans simultaneously with the jobbers. Executive sessions will also be held on Friday morning and afternoon, the latter marking the close of the convention.

The local Committee on Entertainment, under the efficient chairmanship of Col. B. F. Eshelman, are making elaborate preparations by which it is hoped to make the visit of the delegates a memorable one. Among the functions decided on are a reception, opera performance, excursion on river to sugar plantation, carriage drive, &c. All the indications point to a record breaking attendance, including an unusually large number of ladies. The railroad companies of the country have already conceded a rate of one fare and a third for the round trip, and there is some hope that they may also take off the third, so that visitors may make the trip to the Cresent City and back for the usual fare one way.

Special Train from Chicago.

The committee in charge of the special train from Chicago to New Orleans have just issued the following circular as to their plans, which will be of interest to those who already comprise the party and to others who may desire to avail themselves of the obvious social advantages of making the trip in this manner:

The present arrangement for the special train from Chicago to New Orleans is as follows: Leave Chicago via Illinois Central Railroad, Monday evening, November 17, about 7 o'clock, reaching New Orleans the next evening, Tuesday, November 18, at 8 o'clock.

Arrangements have been made for a special car to be attached to the regular train leaving St. Louis Monday evening, November 17, at 10 30 p.m. This car will be attached to Chicago special at Carbondale, Ill., which point will be reached by the Chicago special train at 2.50 a.m., Tuesday, November 18. The St. Louis car will reach Carbondale at 1.25 a.m., Tuesday, November 18. Passengers on the St. Louis car will not be disturbed, however, as the car will be attached and run through to New Orleans as a part of the Chicago special. A large number of delegates expect to go to New Orleans via St. Louis, and this arrangement will doubtless meet their approval.

Delegates from Peoria and nearby points can make connection with the Chicago special at Mattoon at 11.30 p.m., Monday, November 17, boarding the Chicago special at this point, and running through to New Orleans without change. Delegates from Cincinnati, Louisville, Nashville and other points can board the Chicago special at Memphis, at which point we will arrive Tuesday, November 18, at 9 a.m.

We earnestly invite all delegates who expect to go to New Orleans to advise us stating where they expect to board our train, and we will gladly make all arrangements covering sleep-

ing car accommodations. Prompt advice, covering your wants as to sleeping car accomodations, will be appreciated.

The committee are desirous of being advised at as early a date as is possible how many we can expect to join the party. If you have not already notified the committee, please do so at your early convenience.

Address your reply to H. H. Roberts, 1205 Fisher Building, Chicago.

W. H. Bennett,
H. H. Roberts,
Committee.

Hardware Organizations.

Hardware Dealers' Mutual Fire Association of Pennsylvania.

The Hardware Dealers' Mutual Fire Association of Pennsylvania issued their first batch of policies on October 1, as originally planned, the required amount of insurance having been subscribed and the charter granted by the State of Pennsylvania. This company have been organized under the auspices of the Pennsylvania Retail Hardware Dealers' Association. By conservative management as to the selection of risks and by economical administration of the business affairs the company hope to secure for their members a very low insurance rate. In this connection the company have issued two folders, one of which refers to the cost of insurance with the regular companies, which, it is stated, has become a serious matter to the Hardware merchant in Pennsylvania. The other folder, entitled "Insurance at Actual Cost," refers especially to the new company. The following extracts from it will be of interest:

Its Purpose is to furnish insurance at cost.

No Premium Note is taken, but in its place a Deposit, about equal to one cash premium, is made when the insurance begins and is returned when it ends.

Collateral Security is provided by this deposit, thus avoiding all danger of trouble and expense in the collection of dues.

A Guaranty Fund assists in the even distribution of losses over different years.

When the Losses are Low, one-third of the saving over the cost of stock company insurance is placed in the guaranty fund; and

When the Losses are High a certain portion thereof is paid from the guaranty fund.

Withdrawal from the Company is allowed at any time on five days notice.

No Membership Fee, Survey Fee or Policy Fee is required to be paid

Low Expenses: no agents' commissions; no high salaries.

This company insure nothing but Hardware and kindred stocks and the buildings containing them.

Necessarily these risks are widely scattered and are not subject to extensive conflagrations.

Great care is exercised in the selection of only those risks where the physical and moral hazards are good.

By our plan above outlined money is always on hand for the payment of losses, which, therefore, can be settled as promptly as in any company.

It is generally felt that stock company rates on Hardware stores are too high, especially since the recent heavy increase.

This company were organized by Hardware dealers, for the purpose of securing for their members insurance at cost; they have no other purpose. The experience of similar companies shows that we may reasonably expect a substantial saving in the cost of our insurance.

If you would avail yourself of the advantages which this company offer, write the secretary and further information will be furnished you.

The following are the officials of the new company: George L. Moore, who is also president of the state hardware association, Brownsville, president; C. H. Miller, Huntingdon, vice-president, and W. B. Simpson, Huntingdon, secretary.

North Dakota Retail Hardware Association.

At a recent meeting of the Executive Committee of the North Dakota Retail Hardware Association it was decided to hold the next annual meeting at Fargo instead of Grand Forks, as originally intended, and on February 18 and 19, 1903. This action on their part was taken in view of the fact that on those days the annual meetings of the North Dakota Implement Association and North Dakota Grocers' Association will be held in Fargo. It was felt that by meeting together in this way better railroad concessions could be obtained, while many matters of mutual interest could be discussed to better advantage by the three associations.

Retail Hardware and Stove Dealers' Association, of Milwaukee.

The retail Hardware and Stove merchants of Milwaukee, Wis., have recently perfected an organization under the above title. According to a pamphlet just issued giving the constitution and membership roster 30 of the merchants engaged in the Hardware business in Milwaukee have been enrolled up to date as members. As significant of the attention which the new association is giving to trade matters it is interesting to note that at a recent meeting it was unanimously decided to protest against advanced price which the repair houses are asking at the present time for Stove Repairs. The price charged, it is said, is not consistent with the repair charges of houses and foundries in other cities. A. L. Kiefer of A. L. Kiefer & Co., is secretary of this association.

TEXAS RETAIL HARDWARE AND IMPLEMENT DEALERS' ASSOCIATION.

The fourth annual meeting of the Texas Retail Hardware and Implement Dealers' Association was held in Dallas on the 8th and 9th inst. President W. H. Richardson called the meeting to order; on motion roll call was dispensed with. The reports of the secretary and treasurer were read and referred to the Auditing Committee, which was appointed by the chair, and comprised the following delegates: B. J. Williams, L. B. Wright and W. S. Allen. The question of mutual fire insurance was then discussed, remarks being made by the president, O. E. Schow and J. W. McManus. It was finally determined that the Executive Committee should appoint a special committee to consider the subject and make a report.

President's Annual Address.

President Richardson then delivered his annual address, as follows:

Our fourth annual meeting finds our association growing in strength and influence and fully demonstrates the necessity for uniting the retail Hardware trade of Texas in an organization that should be strong in numbers and in its influence.

The report of our secretary shows an increase in numbers and the presence of the number of the dealers here at this busy season of the year shows the interest felt in our meetings. While our members embrace many of the best business men of the State, every Hardwareman in the State would join with us, in order that we may go forward with greater force in the work that we have undertaken.

GROWTH OF THE ASSOCIATION IDEA.

In the last few years nearly all of the Western States and Territories have formed organizations and much good has been accomplished. The formation of the different State associations into a national representative association has created a central power, to which appeals bearing on interstate features can be submitted and adjusted. The influence wielded by the federation will be very great in the near future, and is now already felt, since it is impossible for a State association to handle interstate matters any more than it is possible for an individual to handle State matters. Only in the concentration of the individuals into a central power can we accomplish the work necessary to protect us from obnoxious legislation and the other evils which the retail trade is heir to. Individuals, however influential, cannot control the power necessary to combat the power of money and the concerted effort of our enemies. Eternal vigilance is the price of liberty. We have fully experienced this in the past few years. Our successful efforts in the enactment of certain protective laws and the persistent effort to nullify them could only have been met by the watchful care and the assistance of the members scattered over the whole geographical area of the State. No more fully could this have been realized than when, by a united demand on the members of the Legislature, we succeeded in passing the laws we were so anxious about. Too many of our members only deal in facts transpired and judge of results from their

standpoint; they do not appreciate the efforts made and the necessity for keeping up this combined effort to meet the issues as they may arise from time to time.

No good patriot posted in the great questions important to our welfare is devoting his time and attention to our wants. Without a protecting hand we will be at a disadvantage, with all the world in combination and we alone without.

The necessity being so great, it is strange that every Hardwareman in the State is not in this organization, and not only a member in name, but an active member, working for and watching for the good he may and can do.

"BRANCH HOUSES."

Referring to the federation and its influence for good, a committee from our association was sent to the last annual meeting of the national federation, and from a conference held under the auspices of the federation resulted the commencement of the doing away of the "branch house" evil, which has annoyed the trade of the State for years. This question was of so much importance and involved an underlying principle so far reaching that it was with great alarm we saw the growing tendency to fasten this evil upon the business system of Texas; and it already had taken such a strong hold that those who did not have concerns of this kind were by force of circumstances seriously contemplating the establishment of branch retail houses in self protection, and the arguments advanced were sound, because if a rival manufacturer succeeded and was tolerated by the retail trade, then the competitor would be forced to meet this illegitimate competition by venture, or, as they argued, soon be driven from the locality. The development of this problem, I say, was so far reaching that it became a serious question and one delicate to handle.

It is but natural to resent an attempt by others to regulate your own affairs, and this feeling was already engendered, but by conservative and united action through the national federation and by means of the national interests involved, by getting the dealers alarmed in other States where this system had started, such pressure was brought to bear as will do away with it here.

No manufacturing or jobbing concern can effectually fight the combined efforts of the retail Hardwaremen of the different States, if they will organize locally and nationally. The effect of the agitation of the "branch house" question has been to check its advance and will eventually see its entire obliteration. We no longer hear of new establishments of this kind; and, too, since our efforts have been concentrated against this evil, we are being met in the proper spirit and the houses are being closed as fast as practicable. The last one detrimental to the interests of the local dealer will be closed without a doubt.

PEDDLERS.

The combined efforts of your association have again been taxed in the past year to meet the enemies of the peddler's law, but we have succeeded in forcing the buggy peddler out of the State or to pay his $375 tax where he has peddled.

The Stove peddler, by all kinds of dodges, has evaded the law in many instances. Convicted in Limestone County, they appealed and no decision has ever been had in the higher courts. In Gonzales recently they were fined $600 for violation of the law. The trouble about the enforcement of the law is the criminal indifference of the dealers interested. I find it almost impossible to get men to do their duty, to turn a hand to prosecute these pirates who are robbing them. As president of this association I have without delay outlined the course of action and urged and appealed to the local dealer and the prosecuting officers over the State wherever I could find these Stove peddlers, and only in a very few instances could I get the local Stove dealer to do anything.

It is impossible to make a general law effective if you cannot get the active support of those interested in its enforcement. Why the Hardwaremen will sit supinely by and see their trade taken from them and demoralized and when urged and the course pointed out to them, still do nothing, is beyond my understanding. Not a peddler would be in the State to-day if the local dealer would do his duty.

DISCRIMINATION IN FREIGHT RATES.

The daily discrimination in freight rates is oppressive and a growing evil and cannot be successfully met without interstate influences. The large and powerful combinations of railroad interests are so overwhelming that to compete successfully or to thwart their many and systematic efforts to enact new burdens seems almost impossible, but not despairing, we look forward to the day when the Interstate Railroad Commission will be a thing of life and not, as now, a boomerang. I would urge upon our membership that you work on your Congressman and persistently demand that the Interstate Commerce Commission be made effective. The excessive rates charged into Texas, compared with the same mileage elsewhere shows the necessity of the creation of a power to which we could appeal.

COMBINATIONS OF CAPITAL.

The increasing power of the combinations of capital, commonly known as trusts, are daily growing and encroaching on the narrow field of commercial competition. Plow Trusts, Twine Trusts, Wagon Trusts, Harvester Trusts, Hardware Trusts, to say nothing of the stupendous Steel and Iron Trusts; in fact, there are but few lines of Hardware that can be bought in open and competitive market. It is no longer a question of keen trading and sharp buying, but it is the arbitrary raising and lowering of values at the dictation and to serve the interests of the powerful combinations. It is a condition that is ruinous to the dealer and a power that menaces that freedom of trade that is so essential to a successful business existence.

There is one feature of this trust question that can be controlled by those adversely affected by these methods. As individual members of a community we can influence our surroundings and customers so as to force our Congressmen to take up the fight in Congress on the one great foundation stone of all trusts, which removed, they will fall to pieces of their own weight. The pernicious protective tariff on trust protected articles once obliterated, there will be no longer dictated values. They are protected by arbitrary and unjust discrimination in our tariff laws anywhere from 40 to 50 per cent. Why is it that staple articles, like Nails and Plows, are from 40 to 50 per cent. higher in the United States than the same products of our trusts sold in foreign markets? Nails here at $2.30, there at $1.30; Plows here at $5.75, there at $3.35, and so on.

Build up public opinion, petition and force the Congressmen you create to break down this Chinese wall and the trusts will not stand. Without the tariff shackles we would be shipping Nails and Plows into the port of Galveston and the prices would tumble in a day. Then why sit still and not go ahead and keep up this fight? Only by individual and personal effort can this be accomplished.

I consider the growing evil of these giant combinations not only the greatest evil that the Hardware trade will have to contend with, but the greatest menace to our existence as a free people. Legislation and the execution of the laws are controlled by the vast interests involved. Money is now the powerful factor in legislation —not patriotism; self interest, not the general good. This is not a political but a business issue and must be met by the business element of the country.

CO-OPERATIVE FIRE INSURANCE.

The question of co-operative fire insurance is a matter for our attention. The rise in rates of insurance brings this matter up in mind as an item of increased importance. This question is of great interest to us. We must insure, therefore must be taxed at the dictation of every insurance board that so elects. Other trade associations have inaugurated a successful line of co-operative insurance. Grain and lumber men in our State, Hardwaremen in other States are operating successful fire insurance. And I hope that you will take this matter up at this meeting and thoroughly discuss it. I am in favor of a co-operative insurance company for the Hardwaremen of Texas.

RELATIONS OF MANUFACTURER AND RETAILER.

The relation existing between the manufacturer and the retailer should be one of mutual interest, and of the most intimate and friendly character. Inventive genius, capital and enterprise, coupled with manufacturing advantages, make the manufacturer—but he cannot exist without the consumer. The relation of the manufacturer and the Hardwareman of Texas is now one of mutual benefit and is one of friendly intercourse.

Much of the friction of the past has passed away, and the manufacturer realizes that he must have as part of his venture, and one of the most important to make it effective, an intelligent, live distributer of his product. To manufacture the implement or the vehicle is one thing; to sell or market it another. To manufacture and place it in the hands of the consumer by the same concern has never met with extended success. In a small way it may be done, but when hundreds of thousands are employed in producing, the extended field necessary to distribute the goods necessitates other agencies. Therefore the old way is relegated to the rear and the retail dealer as a distributer looms up as an important factor. His privileges and the field must be safeguarded. The short sighted manufacturer who is not up to date enough to grasp the present will soon be eclipsed by the progressive one who realizes the necessity for fostering and building up a distributive agency as a necessary branch of his establishment. Therefore passes the branch house and the direct to the consumer question, as far as legitimate manufacturers are concerned. No longer are first-class people hunting the retail trade and selling to the consumer.

The time is right on us when the manufacturer will feel a keener interest in the welfare of the dealer than ever. As he expands the necessity for building up his adjunct—the retailer—takes like proportions. Therefore as time passes we get closer together and our interests become one. The failure of the retail dealer retards the development of the manufacturer. Their harmony being a result of the development of the age, it is meet and fit that their interests should become one and identical.

There was no session in the afternoon, which was devoted by the delegates to sightseeing. In the evening they were the guests of the Dallas Implement, Vehicle and Machinery Association at a smoker given at the Windsor Hotel.

THURSDAY MORNING SESSION.

The association reassembled at 9 o'clock on Thursday morning, the first business before the convention being the discussion of the advisability of appointing a committee to wait on the next Legislature, with a view of abolishing the occupation tax. Several methods were suggested, but no definite plan was adopted.

Mr. Thomas' Address.

W. S. Thomas, president of the National Association of Agricultural Implement and Vehicle Manufacturers, who was present by invitation, was introduced to the members, and made a very interesting address on "The Relation Between the Manufacturer and the Dealer," from which we make the following extract:

It was a real pleasure to me to be able to accept the very kind invitation of your officers and attend this meeting of your association. I thoroughly enjoy looking into the animated countenances of men whose names are so familiar and of grasping the hand of so many who have helped to build up this portion of the country and become the leading business men of the places where they reside.

May I also take time enough to congratulate the members of this association that you have organized and sustained this association? And I wish you ever increasing membership, success and usefulness in your work. I thoroughly believe in these dealers' associations. All of them are young in years, but they have already accomplished many good things.

Only a few years ago the retail trade had many grievances against the manufacturers, but already the worst and most of these have been greatly modified or eliminated, and as a rule nowadays when dealers and manufacturers meet together there are few real difficulties to dispose of, so that most of the time can be spent in getting acquainted and planning still greater benefits in the future. So now, when you dealers meet together, you can spend your time discusing things of immediate interest to yourselves and how to conduct your business on a higher plane, with greater ease, more satisfaction and improved profits.

This shows great progress and is a source of unbounded satisfaction to both sides in the case, for, gentlemen, on our side, we do not give the dealers' association alone all the credit for this improvement in relations between dealer and manufacturer.

We manufacturers claim a fair share of the credit ourselves, and this suggests a reference to the National Association of Agricultural Implement and Vehicle Manufacturers, whose representative I have the privilege of being at this convention, not only for the purpose of making this address, but also to confer with you upon any matters of mutual interest, to try to harmonize any apparent differences and to promote friendly feelings and closer relations between the manufacturer and the dealer, and this very getting together, becoming acquainted, with its face to face interviews and heart to heart talks, does more toward making these relations what they should be than all the long range discussions of years.

C. A. Keating of the Dallas Implement, Vehicle and Machinery Association was the next speaker. His subject, "Trinity River Improvement and Its Effect on the Retail Trade," had a local flavor and was listened to with close attention.

The Committee on Nominations, composed of W. S. Allen, T. T. Clark and J. H. Hancock, reported the following names of officers of the association for the ensuing year:

For president, W. H. Richardson of Austin; for secretary and treasurer, Jas. G. Blaine, Taylor; for first vice-president, S. L. Erwin, Honey Grove; for second vice-president, W. M. Gunnel, Marlin; Executive Committee, C. Dickson, Cleburne; J. W. McManus, Waxahachie; Edward Lewis, Gonzales; T. T. Clark, Ennis; J. D. Carroll, Quanah; J. H. Hancock, Paris; J. Allen Meyers, Bryan; W. McB. Smith, Belton; O. E. Schow, Clifton.

On motion, President Richardson was re-elected president for the ensuing year by acclamation. A motion was also made to adopt the report as a whole, which was unanimously carried.

REQUESTS FOR CATALOGUES, &c.

The trade are given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.

The Hack-Sanner Hardware Company have purchased the stocks of the Shamokin Hardware Company, Shamokin, Pa., and of Sanner Bros., Tremont, Pa. The business at both places will be continued under the firm name of the Hack-Sanner Hardware Company. The members of the firm are W. C. Hack and E. D. Sanner of Shamokin, and F. W. Sanner of Tremont. The new house will be pleased to receive catalogues and quotations from manufacturers at both stores as above.

Trost & Doss is the style of a new firm who will open up in the general Hardware business at Philo, Ill., November 1. They will be pleased to receive catalogues, price-lists, &c., relating to Hardware and allied lines.

Oshkosh Logging Tool Company, Oshkosh, Wis., contemplate erecting a new factory in the near future, and will be in the market for the most modern equipment they can secure. The company will be pleased to hear from manufacturers who are in a position to supply machinery and tools to meet their requirements.

H. W. Morse, Meriden, Conn., is putting in a general stock of Hardware. He is desirous of securing catalogues and other printed matter relating to Shelf Hardware, House Furnishing Goods, Mechanics' Tools, Farm and Garden Tools and Seeds.

THE TOLEDO STAMPING COMPANY.

TOLEDO TUBE COMPANY, Toledo, Ohio, have been succeeded by the Toledo Stamping Company. The capital of the old concern was $50,000, but the new company have been capitalized at $300,000. Approximately there is no change in the business affairs of the company, as I. N. Humphrey remains president, C. E. Swartzbaugh, vice-president; A. R. Miller, treasurer, and L. Bateman, secretary and treasurer. The stock is controlled by the original stockholders of the Toledo Tube Company, Messrs. Humphrey and Bateman. The company expect to put up a large new plant. Their plans are all ready and they will commence building at once. Not only will they take up the full line of Shovels and other specialties which they are making at the present time, such as Tubing, Music Stands, Umbrella Rods, Brackets, &c., but will add all kinds of sheet steel stampings to their line.

TERRE HAUTE SHOVEL & TOOL COMPANY.

TERRE HAUTE SHOVEL & TOOL COMPANY, Terre, Haute, Ind., have sold the Steel Goods department of their business, including Forks, Hoes, Rakes, Weeders and Hooks, to the American Fork & Hoe Company. In the quarters formerly occupied by this branch of their business the company expect to install Shovel machinery of the newest and most improved pattern. When all plans are completed which are now in contemplation and in process the company will be able to furnish Shovels of every description. Their capacity will, it is expected, be from 400 to 500 dozen per day, so that they will be in a position to take care of any large orders with which they may be favored.

TRADE ITEMS.

JOSEPH BARDSLEY, 147-151 Baxter street, New York, manufacturer of the Bardsley Oil Door Check and Spring, recently received from his Canadian agent in Toronto advices to the effect that the volume of business in this specialty now pouring in warranted the prediction that he will market from 5000 to 10,000 of this make of Door Check during the ensuing season. Among the larger buildings in which they are installing the Bardsley Check is the new $1,000,000 King Edward Hotel now being built.

J. C. CALDER of the firm of Black Bros., Halifax, N. S., dealers in General Hardware and Ship Supplies, is now in New York on a pleasure trip.

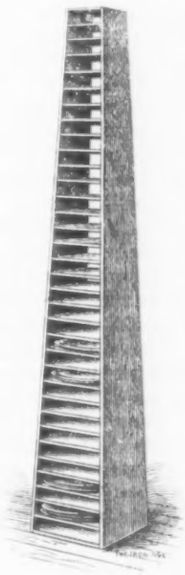
THE marriage of Sidney P. Johnston, editor of the *American Artisan*, to Miss Alice J. Evans is announced to take place on Wednesday afternoon, October 29, at the South Congregational Church, Drexel Boulevard and Fortieth street, Chicago. Mr. and Mrs. Johnston will be at home after January 1, 1903, at 657 Pine Grove avenue. Mr. Johnston is deservedly popular for his integrity and many other manly qualities, and is the recipient of many congratulations.

THE GLASBRITE COMPANY, 1328 Williamson Building, Cleveland, Ohio, are putting on the market what they style Glasbrite, which is a combination of chemicals designed to clean the windows of foundries, grinding and forging rooms, &c. The preparation is offered in two grades, for office and store windows, and No. 2 for factories. The manufacturers remark that there is not a factory window which Glasbrite will not clean with one rub. The polish is referred to as a chemical mixture that at once loosens the dirt and grease, so it can be wiped off with ease, leaving even the corners of the greasiest panes clear. The company state that it contains no sand to scratch, soap to streak, acid to injure the hands or whiting to mar the frame. It is referred to as so economical that a dozen cakes will clean a good size factory, and that the work may be done while the sun is shining on the glass.

Leonard & Blevins have been succeeded by Charles E. Thomas in the Hardware, Stove, Farm Implement and Sporting Goods business in Gravette, Ark.

A STAND FOR COVERS.

A STAND for covers that is 7 feet 10 inches high is found in the store of R. W. Raymond, Stamford, Conn. It is made entirely of ½-inch pine and has 34 square shelves, the bottom one measuring 16 inches on

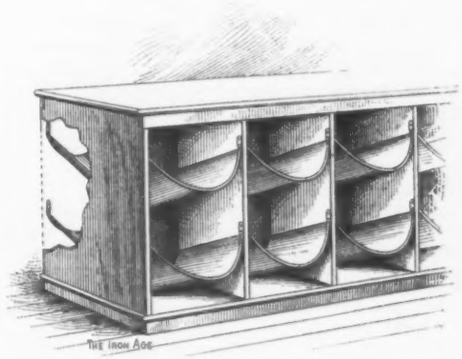


A Stand for Covers.

a side and the top one 8. It will be seen that this stand holds a very large assortment of sizes and is larger than is required in most stores.

A CONVENIENT NAIL COUNTER.

A CONVENIENT Nail counter that has recently been put into the store of E. H. Lawrence, Stamford, Conn., is shown in the accompanying illustration. This counter is a double one, having nine compartments for Nails on each side, two pans being placed in each compartment, as shown. The pans are made of galvanized iron and the lower outside ends project about 4 inches



A Convenient Nail Counter.

beyond the sides of the counter. The edge of the galvanized iron is bent around a 5-16-inch round iron rod which is flattened at the ends where holes are bored to receive screws. The sides of the pans are nailed to the upright partitions, as shown. Wire Nails are kept in one side of the counter and Cut Nails in the other. When the bins are to be filled the Nails from the kegs are generally dumped into a Coal Scuttle and thus easily emptied into the bins.

A. G. Copeland & Co. have sold their Hardware, Stove, Agricultural Implement and Sporting Goods business in La Cygne, Kan., to Richardson Hardware Company, who will continue at the old stand.

NOTES ON FOREIGN TRADE.

BRITISH LETTER.

Office of *The Iron Age*, Hastings House, Norfolk St., London, W. C., Oct. 11, 1902.

The Week's Hardware Trade.

ALTHOUGH at this time of the year the home trade in many of the miscellaneous Hardware industries should be the busiest of the whole year home orders are by no means up to expectation or even to average. Manufacturers both in the Midlands and Sheffield are hard put to it to keep their works going full time, and several of them are not even doing that. I think it is true to say that the whole market is being held up by the high price of raw materials and the uncertainty in the near future. The sudden heavy demand made by America on this country for coal adds to our difficulties. Fortunately both during the week and the month the rather stagnant home market has been counterbalanced by some good orders from abroad. To begin with, South African orders are to some extent materializing, and I shall show later on that even if the South African boom has disappointed expectations yet none the less a fair volume of goods is being sent there. The South American trade, particularly Chile, Argentina and Peru, has distinctly improved during the past few days, and unexpected and exceptional orders have come from America and Canada. We are driving a good trade just now with India, but Australian trade is quiet, with the exception of good orders received for Galvanized Iron Sheets and Water Tanks. Indian orders have come to hand for these goods as well, in addition to orders for Yellow Metal, Mining and other Machinery and Cultivating and Road Making Tools, but in Hardware information from India is to the effect that German and Belgian competition is getting the better of us. After a period of slackness some large indents have again been received from China. The Japanese trade is at all times difficult to follow, but exporters to that country are more hopeful just now than they have been for some time past. It is worth noting that Metallic Bedstead makers, both on home and overseas account, are finding their trade interfered with on account of the growing popularity of artistic Wooden Bedsteads. If this is the case American manufacturers should look to it.

The Razor trade is again having attention directed to it in Sheffield. I quote the following comment upon the Sheffield Razor trade as a good indication of what many people in Sheffield are thinking. The writer says:

> The period seems to have come around again for lecturing Razor manufacturers on their lack of enterprise in not availing themselves of machinery in the production of their goods, and the men for not helping them in doing so. It is the old story repeated over and over again any time in the last 30 or 40 years. There is no question that some leading local Razor manufacturers encouraged the use of and helped to "boom" the German Hollow Ground Razor; they advertised them as "ground in Germany," and they still send their Razors there to be ground as the cheaper and more expeditious way of having the work done. On the other hand, hollow grinding has been cultivated here and pronounced to be equal to anything obtained from abroad. Leading Razor makers have this week been asked if they had ever been approached on the subject of using machinery for hollow grinding and they replied that they had not, and they are under the impression that the work is still being done by hand both in Germany and in America. From other sources it was ascertained that it would be easy to introduce improved methods of working which would cheapen production, but that the men were the obstacle to anything of the kind. The Razor trade at the present time is quiet. The heavy contracts placed some time ago for Clasp Knives and Razors by Government Departments are now practically worked off, and it is scarcely expected that more work will be given out at present.

On the whole, it may be said that the Hardware and metal trades of this country are not in a position to brag very much.

Nine Months' Foreign Trade.

With the end of September came the end of the third quarter of the year, and naturally we are interested to discover how we stand as compared with last year. On the import side it may be noted that our imports of Cutlery have slightly decreased from £25,866 to £23,844, while our imports of Hardware have increased from £780,497 to £999,210. This, however, is counterbalanced by a drop in our purchases of Electrical Goods and Apparatus from £683,820 to £514,255. Our imports of Brooms and Brushes have risen from £209,049 to £231,003 on the nine months' trading. To be perfectly clear, all the figures I am quoting relate to the nine months' trade. Not much significance, however, can be attached to any of these figures, because we know that the demand for metal goods of all sorts in the American market is above the average, and the real test and significance will come later when Americans are in a position to compete easily so far as deliveries are concerned with Great Britain and Germany. The activity of the American market has, of course, reacted favorably upon the export trade of Great Britain. Our exports of metals and articles manufactured therefrom have risen from £29,697,510 to £31,445,268, an increase of £1,747,758, but a decrease of £3,627,174 on the first nine months of the year 1900. On examining these figures in greater detail the general conclusion is that while we have been disappointed in the European market, we have more than made up for it by increased sales to South Africa. I include in this letter three tabular statements giving the exports of Cutlery, Hardware and Galvanized Sheets, the two former because they are in lines in which Americans can compete, and the third because it is a line which, in my opinion, Americans must develop in the near future. Observe, for example, the large increase in our sales to Canada of Galvanized Sheets:

	Values. Nine months. 1901.	1902.
Cutlery: To Russia	£1,643	£2,266
Sweden	678	1,101
Norway	1,646	1,525
Germany	12,377	13,161
Holland	1,339	1,213
Belgium	2,330	1,967
France	2,277	1,605
Spain and Canaries	1,650	2,198
United States	57,438	52,608
Foreign West Indies	5,046	4,512
Chile	10,238	10,066
Brazil	20,614	20,016
Argentine Republic	15,655	11,621
British South Africa	57,866	92,106
British East Indies	44,545	40,082
Australasia	118,939	105,159
Canada	35,585	46,688
Other countries	74,693	71,546
Totals	£464,559	£479,440
Hardware unenumerated: To Russia	£42,197	£38,704
Sweden	18,914	18,219
Norway	16,323	15,941
Germany	82,375	76,861
Holland	70,835	74,717
Belgium	46,365	42,211
France	16,837	17,654
Spain and Canaries	11,891	16,960
United States	31,201	35,289
Foreign West Indies	16,402	10,653
Chile	15,865	15,866
Brazil	15,719	19,943
Argentine Republic	20,932	15,524
British South Africa	97,974	144,423
British East Indies	123,123	133,589
Australasia	204,005	181,661
Canada	16,580	23,012
Other countries	211,135	245,179
Totals	£1,058,673	£1,126,406
Galvanized Sheets: To Germany	£40,469	£34,804
Holland	9,256	8,906
Portugal, Azores and Madeira	8,603	12,542
Spain and Canaries	12,419	13,238
Dutch East Indies	33,483	53,390
Philippine Islands	34,478	24,644
Foreign West Indies	27,154	26,001
Mexico	47,342	59,848
Central America	13,631	22,093
Chile	77,532	38,354
Brazil	16,537	31,867
Uruguay	39,331	31,129
Argentine Republic	276,947	181,606
British South Africa	250,672	548,556
British East Indies	430,007	516,538
Australasia	610,527	726,583
Canada	74,783	144,529
British West India Islands and Guiana	22,144	25,643
Other countries	318,191	488,946
Totals	£2,343,506	£2,989,217

From the foregoing tables it will be observed that the Hardware and metal export for the nine months has been saved from actual decline by large orders from South Africa.

The Tin Plate Trade.

Great interest has been taken on this side in the negotiations between the Tin Plate manufacturers and their employees with reference to the proposed reduction in wage of 25 per cent. on the rebate trade. It is needless to say that had the Tin Plate operatives in America agreed to this reduction it would have hit the South Wales trade very hard indeed. As showing how very delicate is the organization of the Tin Plate trade, there has recently been a strike of boiler firemen in Llanelly, who wanted to work eight hours instead of the usual 12, and this stoppage actually brought several important works to a standstill and threw 4000 men out of employment. The question has now gone to arbitration, and the men are at work again. With the exception of one or two good markets, the Tin Plate trade generally is, if anything, depressed. While it is true that the mills are fairly well occupied, prices are distinctly unremunerative. During the past week or two this tendency has become more marked. During the nine months just ended the exports of Tin Plates reached £3,164,446, as compared with £2,706,985; but the month of September showed a decrease of nearly £4000 and over 1000 tons. Of the total exports of Tin Plates, valued, as I say, at £3,164,446, no less than £664,333 were exported to the United States and £209,012 to Canada. There has been a distinct falling off in Russian demands, but Germany, Holland, France, Portugal, Italy, Roumania, Brazil, Argentina, British East Indies, Australia, New Zealand, have all bought Tin Plates in increased quantities during the nine months. Germany has been buying Tin Plates very heavily of late, the figures for the month of September reaching £33,701, as compared with £9921 in September last year. The tonnage in this instance is 2137, as compared with 756 tons in September last year.

Lock Trade Difficulties.

I have kept your readers informed of the dispute between the Lock makers and their workmen. Matters have now come to a head, and the men have decided to give in their notices. They have expressed themselves willing to submit their case to an impartial arbitrator, to to appointed by the Board of Trade or any other body, and further state that they are anxious to avoid a strike. At the same time they demand 10 per cent. advance on wages. The employers state their case in the following terms:

(1) We maintain that all workmen in the Lock trade who average 54 hours per week can earn a good wage under present conditions—viz., 20 per cent. advance on old prices, and on new patterns the advance is quite equal to 30 per cent. (2) From official reports the wages of 80 per cent. of the workmen in this country have been reduced 7½ per cent. during the present year, which clearly indicates a falling market, and under these circumstances we think it unreasonable to ask for any further advance. (3) We frequently hear that the Germans and Americans earn more than the Englishmen, but we never see the fact stated that while the English Lock maker does not average more than 50 hours per week, the Germans and Americans work over 60 hours.

WALWORTH MFG. COMPANY'S CATALOGUE.

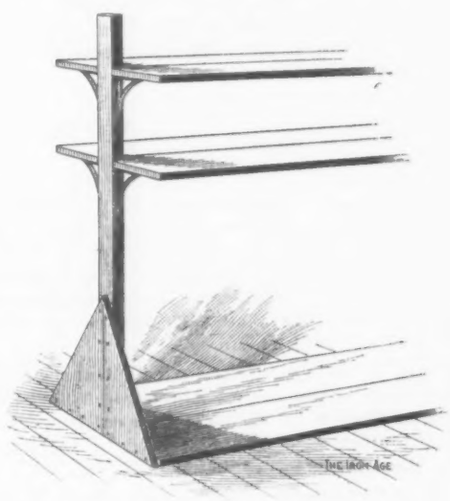
THE WALWORTH MFG. COMPANY, Boston, Mass., have just issued an excellent catalogue of 351 pages, substantially bound in cloth. In the early pages of the book are views of the company's factory, pipe shops and storehouse, general offices in Boston and the Park Row Building, in which are the New York offices, the buildings occupied by their agents in London and Paris. Portraits are also presented of the five "pioneers" of the company, J. J. Walworth, C. C. Walworth, E. C. Hammer, M. S. Scudder and Joseph Nason. The catalogue is devoted to Brass and Iron Goods and Tools, which the company manufacture; also to Wrought Iron Pipe and Supplies for steam, water and gas work, in which they deal. There are 11 divisions into which the goods are divided, each division being preceded by a handsomely engraved page. The book is well printed on a fine quality of paper, with convenient arrangement of prices and illustrations, the general make up of the catalogue being very creditable and worthy of the long established concern by whom it is issued.

THE WITTE HARDWARE COMPANY'S CATALOGUE.

THE WITTE HARDWARE COMPANY, St. Louis, Mo., have issued a substantially bound catalogue of 1540 pages representing the lines of goods handled by them. An engraving at the front of the book shows their office and salesrooms at 704 and 706 North Third street and warehouses at 705 and 707 North Second street. The 28 pages following are required for the index. The goods are arranged in departments, the first division being devoted to Mechanics' and Agricultural Tools, the second to General Hardware, the third to Builders' Hardware, the fourth to Tinners' Supplies and Tools, Stoves, Lamps, Enameled and Tin Ware and House Furnishing Goods, and the fifth department to Guns and Sporting Goods, Cutlery, &c. It has been the aim in arranging the catalogue to so classify the goods that customers can find an article wanted without referring to the index. The company pay especial attention to mail orders. A cut is shown representing an envelope which is furnished to their customers gratis. This is addressed to the company, and has printed in the upper left hand corner these words: "Order for Hardware, Ship To-day." The business was founded in 1849 and incorporated in 1880. From a comparatively small beginning the business has grown to its present magnitude. The company are to be congratulated upon the production of such a catalogue, which will prove a great convenience to their customers.

A STAND IN THE AISLE.

IN the center of the aisle between the counters in the store of Stark Bros., Stamford, Conn., stands a set of shelves as shown in the illustration. These are very useful for showing an assortment of goods where customers are likely to be attracted by them. From the illustration it will be seen that the 2 x 4 upright is held in position by being fastened to the two triangular boards, which in turn are fastened to the bottom boards of the stand. The two upper shelves are held on ordinary shelf brackets fastened to the 2 x 4 upright.



A Stand in Center of Aisle.

Horton & Elliott are a new firm at Laceyville, Pa. They are handling both Shelf and Heavy Hardware, Stoves and Tinware, Agricultural Implements, Sporting Goods, &c.

PRICE-LISTS, CIRCULARS, &c.

THE CLEVELAND HARDWARE COMPANY, Cleveland, Ohio: Booklet showing Rolled Steel Carriage and Wagon Hardware, including Bailey Hangers, Body Loops, Shaft Irons, Pole Braces, Spring Bars, Rub Irons, Steps, &c. This booklet shows only a few of their products, but the company hope that the exhibit will be found so interesting to the trade that they will ask for a copy of their complete red catalogue, which will be cheerfully furnished on application.

THE BROHARD COMPANY, 1624 North Ninth street, Philadelphia, Pa.: The Brohard Improved Expansion Bolts. An illustrated catalogue and price-list shows a variety of these goods adapted to different uses.

THE BROWN, HINMAN & HUNTINGTON COMPANY, Columbus, Ohio: Farm and Garden Tools. For the season of 1902-1903 the company issue a revised and illustrated catalogue and price-list of the above goods. Several new Tools are to be noted as well as improvements in old ones.

J. L. OEFINGER & Co., 16 North Canal street, Chicago, Ill.: Illustrated catalogue of Gas, Electric and Combination Fixtures. The company also manufacture a Combination Tumbler and Tooth Brush Holder, Towel Bars, &c., which is a new line with them.

BARNEY & BERRY, Springfield, Mass., Walter B. Stevens & Son, agents, 114 Chambers street, New York: Skates. Their 1902-1903 catalogue illustrates Ladies' and Men's Club, Lock Lever, Rink and Hockey Skates, Ankle Support Skates, Racing Skates, Skating Shoes, Pocket and Folding Pocket Keys, &c.

THE HARD STEEL WIRE FENCE COMPANY, Cuyahoga Falls, Ohio: Catalogue devoted to the Hard Steel Wire Fence and Hard Steel Coiled Wire. Some months since the company removed their works from Cleveland to Cuyahoga Falls owing to the necessity of increased facilities for their growing business.

PHILLIPS & BUTTORFF MFG. COMPANY, Nashville, Tenn.: Catalogue No. 123, devoted to Iron and Wood Mantels and Grates, Mantel Cabinets, &c. The company also manufacture Cooking and Heating Stoves, Ranges, Stove and Country Hollow Ware, Ventilators, Plain, Stamped and Japanned Tinware.

THE A. DUDLY MFG. COMPANY, Menominee, Mich.: Catalogue of Tools and Bicycle Specialties, including Combination Wrenches, Auto Wrenches, Nipple Grip, Wheel Truing Stand, Tire Separator and Feeder and Universal Frame Jig.

THE DELAWARE HARD FIBER COMPANY, Wilmington, Del.: Catalogue relating to Fiber Rods, Rolled Tubing, Washers and Disks, Fillings, Gears, &c.

THE JANESVILLE HAY TOOL COMPANY, 122 Lake street, Chicago, Ill.: Catalogue of Hay Carriers, Hay Slings, Forks, Hooks, Pulleys, Hardware Specialties, &c. The company's Dead Lock Hay Carrier is shown for wood and rod or cable track. The Hardware Specialties include Hay Fork Equipments, Cider Mills, Corn Shellers, Hand Carts, Warehouse Trucks, Corn Planters, Wire Stretchers, Tank Heaters, &c.

AURORA ACETYLENE COMPANY, Chattanooga, Tenn.: Manufacturers of the Aurora Automatic Acetylene Generator, and dealers in all kinds of Acetylene Fixtures, &c. The company's catalogue, "Modern Lighting," relates to these goods.

MYERS & ERVIEN COMPANY, Ogontz, Pa., C. K. Turner & Son, 76 Broad street, New York, export agents: An illustrated export catalogue and price-list relates to Hay, Manure, Spading, Sluce, Tanners', Coke, Coal, Charcoal, Oyster, Turnip or Beet and Spall or Ballast Forks.

MONARCH GRUBBER MFG. COMPANY, Lone Tree, Iowa: Catalogue of Grub Stump Pulling Machinery and all appliances for clearing timber lands, Feed Mills and Wagon Scales. In connection with other illustrations a number of views are presented showing their Monarch Grubber at work on formidable stumps in different parts of the country. A number of testimonials are also embodied in the catalogue,, the closing pages of which are devoted to the Hustler Feed Mill and Monarch Pitless Wagon Scales.

CONTENTS.

	PAGE.
The Potter & Johnston Automatic Chucking Machine. Illus.	1
Central Pennsylvania News	2
The Present Condition of the Manufacture of Aluminum	2
The Whiting Belt Power Riveter. Illustrated	3
A New Blast Furnace	3
The Manufacture of Ferromanganese in Russia	3
The Crucible Steel Company of America	4
The Ransom Electrically Driven Grinder. Illustrated	4
A New Plant for Handling Blast Furnace Slag. Illustrated	5
The Technolexicon	7
An Englishman on American Rolling Mills	8
The Columbus Iron Works	9
The Rio Grande River Bridge, Costa Rica. Illustrated	9
Notes from Mexico	12
The Lebanon Strike	13
The Suppression of Smoke in Steam Plants Using Bituminous Coal.—IV. Illustrated	14
The Steam Turbine. Illustrated	18
Lake Ore Matters	24
The Mesaba Range	25
The Hill Machine Tool Vise. Illustrated	27
Editorial:	
Labor and the Anthracite Coal Strike	28
The Bond Purchases	28
Pittsburgh as An Iron Center	29
Pacific Coast News	29
Misleading Reports on Oil Burning Furnaces	30
Cleveland's New Machinery Warerooms	30
The Standard Chain Company	31
Municipal Contracts and the Eight-Hour Day	31
Obituary	32
Large Purchases of Ore Property	32
Coke Property Purchased	32
The Monessen Furnace Company	32
Freight Carrying by Electric Railroads	32
The Reduction of Transvaal Customs Duties	32
Manufacturing:	
Iron and Steel	33
General Machinery	33
Boilers, Engines, &c	34
Foundries	34
Bridges and Buildings	35
Fires	35
Hardware	35
Miscellaneous	35
The Iron and Metal Trades:	
Comparison of Prices	37
Chicago	37
Philadelphia	39
St. Louis	40
Birmingham	40
Cleveland	41
Cincinnati	42
Pittsburgh	42
New York	44
Metal Market	44
Iron and Industrial Stocks	44
New York Machinery Market	45
German Iron and Steel Trade	46
Trade Publications	47
Personal	47
Another Possible Ore Road for Pittsburgh	48
The Duty on Steel Billets	48
A Steel Rail Record	48
Hardware:	
Condition of Trade	49
Notes on Prices	50
The Break in Shovel Prices	52
Freight Rate Reductions, Chicago to Missouri River Points	53
The National Hardware Association	53
Hardware Organizations	54
Hardware Dealers' Mutual Fire Association of Pennsylvania	54
North Dakota Retail Hardware Association	54
Retail Hardware and Stove Dealers' Association, Milwaukee	54
The Texas Retail Hardware and Implement Dealers' Association	54
Requests for Catalogues, &c	56
The Toledo Stamping Company	57
Terre Haute Shovel & Tool Company	57
Trade Items	57
A Stand for Covers. Illustrated	57
A Convenient Nail Counter. Illustrated	57
Notes on Foreign Trade	57a
Walworth Mfg. Company's Catalogue	57b
The Witte Hardware Company's Catalogue	57b
A Stand in the Aisle. Illustrated	57b
Price-Lists, Circulars, &c	58
The Penn Tack Company	59
Among the Hardware Trade	59
Miscellaneous Notes:	
New Lock Set Designs	60
Carvers, Can Openers and Scrapers	60
Perfect Manicure. Illustrated	60
The W. R. S. Divergent Corrugated Fasteners. Illus.	60
Flush Sliding Door Latches. Illustrated	60
Crescent Wave Sprinkler. Illustrated	60
The Hubbell Standard Pull Cluster. Illustrated	61
Reissmann's Perfection Sandpaper Holder. Illustrated.	61
Economy Meat and Food Chopper. Illustrated	61
Removable Chair Seat. Illustrated	61
Corbin's Duplex New Departure Coaster and Brake. Illustrated	62
The Hurwood Machine Screw Driver. Illustrated	62
Current Hardware Prices	63
Current Metal Prices	70

THE PENN TACK COMPANY.

THE PENN TACK COMPANY, Norristown, Pa., have recently made several important changes in the management of their concern. The entire stock has been acquired by W. N. Easton and G. W. Rambo, who have been actively identified with the company's business for the past ten years. Previous to that both gentlemen were engaged in the Tack business for several years in other cities, Mr. Easton in Pittsburgh and Mr. Rambo in Rockford, Ill., so that they have a thorough knowledge of every detail of the business. Many improvements have been made in the plant at Norristown lately, new machines having been installed, extensive repairs made and new systems adopted, all of which have placed them in position to fill orders promptly and efficiently. One of their new departures is the installing of an electric plating outfit for Brass Plating Nails. The goods after going through this process, it is stated, cannot be distinguished from genuine Brass Nails, so perfectly are they manipulated. At the present time they are crowded with orders for this particular kind of work. In fact they are pushed with work in every department of their factory. About 50 machines are run almost to their full limit for 60 hours each week, and their capacity is very nearly 3½ tons of Tacks and Small Nails per day. Mr. Easton, the president of the company, looks after the commercial part of the business, and has charge of the buying and selling, while Mr. Rambo has complete charge of the practical part, superintending the making and getting out the goods.

AMONG THE HARDWARE TRADE.

Rosebrooks & Cummings have purchased Cyrus Spaulding's Hardware store in West Medway, Mass., and will continue the business, which was established 75 years ago.

The Hardware store of P. Moran & Son, Lockport, N. Y., was damaged by fire to the extent of several hundred dollars a short time since. The loss was fully covered by insurance.

F. J. Tallant has disposed of his Hardware, Harness and Saddlery business in Garnett, Kan., to W. S. Tallis.

Laurium Hardware Company, Laurium, Mich., sustained $1500 damage from fire on the 3d inst. Insurance fully covered the loss. The company carried a stock of about $14,000. Business was interrupted for only a short time.

C. O. Arnold, Hardware merchant, Woonsocket, R. I., has removed to more attractive and convenient quarters in the Commercial Block.

L. H. White has disposed of his Hardware, Stove, Sporting Goods and Harness stock in Cogswell, N. D., to W. D. Prentice, who continues at the old stand.

J. H. Parker & Son, Fairmount, Ind., have sold their Hardware, Stove and Tinware business to Wright & Miller.

Martin Grafius of the firm of Grafius & Brown, wholesale and retail dealers in Hardware, Stoves, Farm Implements, Sporting Goods, &c., Martinsburg, Pa., has disposed of his interest to his partner, Yerre Brown, who will continue under his own name.

Hack-Sanner Hardware Company have purchased the stock of the Shamokin Hardware Company, Shamokin, Pa., as well as the stock of Sanner Bros., Tremont, Pa. The business at both places will be continued under the style of Hack-Sanner Hardware Company.

Dagleish & Everett's Hardware and Furniture store in Lebanon, Ore., was badly damaged by fire on the 17th ult. The loss was $5000, partly covered by insurance. The firm have rebuilt the warehouse, which was partially consumed. They are intending to put up a brick building in the spring, which will be 50 x 100 feet, with iron warehouse in rear, 54 x 65 feet. They are dealers in Shelf and Heavy Hardware, Stoves and Tinware, Agricultural Implements, Sporting Goods, Paints and Oils, Glass, Crockery, House Furnishing Goods, Furniture, &c.

Frank Stanton has sold his business at Clay Center, Neb., to N. Mackey.

Neill Stewart & Sons have bought the interest of E. W. McCann in the Hardware business of McCann & Outman, Pullman, Wash., and will take possession November 1. A new brick building two stories high, in the rear of that now occupied by Neill Stewart & Sons, will be erected and occupied by the new firm. Stewart & Sons have been engaged in the Agricultural Implement business at Pullman since early last spring. Mr. Outman will retain his interest in the new concern, the style of which has not yet been determined.

H. A. Peterson has disposed of his Hardware, Stove, Farming Implement, Sporting Goods and Harness business in Pilger, Neb., to A. A. Antles & Co.

Whiton Hardware Company, Seattle, Wash., have moved into their new store, four doors from the old stand, where they have been located for the past 12 years. They have been obliged to make this change in order to get room to conveniently handle their rapidly growing business. The new quarters have a frontage of 26 feet, with 110 feet depth, three floors and basement being occupied. The building is modern in every respect. It is of brick and built with special reference to handling heavy goods. The main floor is 21½ feet in hight and there is excellent light and ventilation everywhere. Two freight elevators have been installed. The officers of this company are C. W. J. Reckers, president and manager; John F. Welborn, vice-president, and John Reckers, secretary and treasurer. Their business is wholesale and retail and the stock comprises Shelf Hardware, Shop Supplies, Sporting Goods, &c.

L. J. Zimmer has purchased the retail Hardware, Stove, Farm Implement and Sporting Goods business of H. S. Mason & Son at Altoona, Iowa.

E. Curtis McKenney has opened a new store in the Walton & Wilson Building in Saugus, Mass. Mr. McKenney has been identified with the Hardware business for about 17 years, the past four years as traveling representative of a Boston jobbing house in Vermont and New Hampshire. Mr. McKenney's line includes Shelf Hardware, Stoves, Tinware, Agricultural Implements, Sporting Goods, Furnaces, Paints, Seeds, &c.

F. G. Schadegg has lately opened a store in Aitkin, Minn., handling Shelf and Heavy Hardware, Stoves, Tinware, &c.

Frank W. Shultis has purchased the Shelf and Heavy Hardware, Stove, Tinware and Sporting Goods stock of C. R. Rice in Cambridge, Iowa. Mr. Shultis has enlarged the stock formerly carried with a view to making it as complete as possible.

The Rogers Supply Company are successors to J. C. Rogers & Co., Wamego, Kan. They have added a complete plumbing and tin shop.

The Sohn Hardware Company, Harrison, O. T., have sold out to O. H. Minton & Bro., who continue at the old stand.

James Tozer & Co. have opened a new store in Revere, Mass., their line comprising Shelf and Heavy Hardware.

G. P. Whitham has purchased a half interest in the retail Hardware, Stove and Sporting Goods business of D. F. Phillips in Fairfield, Neb., and the style is now Phillips & Whitham.

C. E. Wills, who withdrew from the firm of Wills & Ordung, Hannah, Ind., recently, has opened a Hardware store in the same city, purchasing a stock order from Geo. H. Trout & Co., of Chicago.

Edwards Hardware Company have succeeded G. R. Cockrum in Cordell, O. T. The new proprietors have doubled the former stock and are doing some jobbing in connection with the retailing of Shelf and Heavy Hardware, Stoves and Tinware, Sporting Goods, &c.

MISCELLANEOUS NOTES.

New Lock Set Designs.

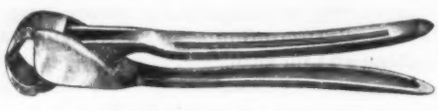
Reading Hardware Company, Reading, Pa., and 96-98 Reade street, New York, have just brought out a number of new designs in bronze builders' hardware for interior and exterior trim, which can be furnished in a number of finishes in complete lines for the various parts of residence or building. The Pelham design is in wrought bronze, the front door escutcheon, for instance, being a long oval with beaded edge, the beads being largest in the center and diminishing by degrees both ways on each side, while the knob has a circular run of beading of uniform size. The Lydia is made of cast bronze with a rectangular escutcheon plate with ornamentation of like character around the edges and in circular form on the knob. Another style is the Helena, in cast bronze, which has a long rectangular escutcheon with beaded edges on both plate and knob of uniform size. A fourth style is the Selinus, cast bronze, the ornamentation on plate and knob being a decided contrast of pleasing design.

Carvers, Can Openers and Scrapers.

Goodell Company, Antrim, N. H., and 10 Warren street, New York, have recently greatly enlarged their assortment of table carvers by the addition of 17 new patterns in 6, 7, 8 and 9 inch blades, with celluloid, rubber and stag handles, making a total of 27 styles and sizes in all added to the line, which taken in its entirety can be profitably retailed at from 50 cents a pair to $8 a set of three pieces. Some of the new goods have sterling silver mountings. One of the carvers, No. 6238, is an entirely new shaped blade. The Acme can opener of their manufacture is now put up in a display box for counter use to sell from, packed 12 in a box, with easel back. In painters' scraping knives they now make, in addition to their regular 3-inch blade, one ½ inch smaller and another as much larger—viz., 2½ and 3½ inch.

Perfect Manicure.

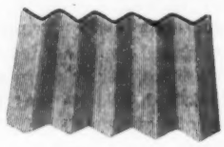
Eagle Bicycle Mfg. Company, Torrington, Conn., have just put on the market what they call the Perfect Manicure, which is shown in the accompanying illustration, full size. Though not shown in the illustration, there is a simple but effective bit of mechanism for keeping the handles close together when not in use, there being a small coiled steel spring around the pivot on which the jaws move, to expand them when in operation. The nippers are put up in neat leather knife cases with flap and snap glove button. As furnished to the trade they are mounted on cards for display purposes in an attractive way, one dozen on a card, to stand on showcase or counter and sell from.



Manicure or Nail Nipper.

The W. R. S. Divergent Corrugated Fasteners.

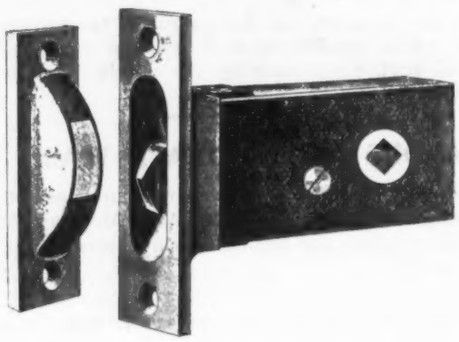
The accompanying cut represents divergent or beveled corrugated steel fasteners, put on the market by W. R. Smallwood Mfg. Company, Gowanda, N. Y. The advantage claimed for this make of divergent fasteners is that the drawing together of the joints is equalized between all the corrugations. The company also manufacture an extensive line of straight corrugated steel fasteners.



The W. R. S. Divergent Corrugated Fasteners.

Flush Sliding Door Latches.

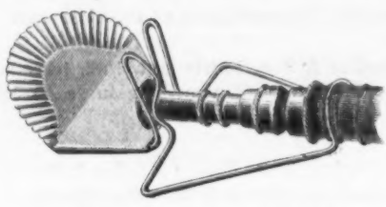
Reading Hardware Company, Reading, Pa., and 96-98 Reade street, New York, have recently marketed a sliding door latch as here shown. The distinctive feature of this article is the flush latch bolt and rounded strike to protect persons from injury when passing in or out. The latches are made in two sizes—viz., 1¾ x 3¼ inches and 1¾ x 5¼ inches in dimensions. Both have plain bronze fronts, bronze bolts and strikes. The case is ⅝ inch thick; width of front, 15-16 inch, and there is a bronze hub for 5-16-inch spindle. The distances from front to center of hub are respectively 2½ and 4½ inches. They are suitable for either right or left hand, and can be operated by knobs or flush cup handles from both sides.



Flush Latch Bolt with Rounded Strike.

Crescent Wave Sprinkler.

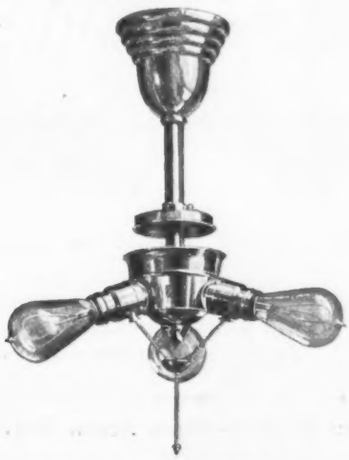
E. M. Hotchkiss Company, New Haven, Conn., are introducing their Crescent Wave sprinkler as here shown for spraying lawns, &c. It consists of a formed wire support for a corrugated metal plate which distributes the water as it issues from the nozzle to which it may be attached. Some of the features of the device to which the company invite attention are that it can be used in connection with almost any nozzle, can be operated from the hand, supports nozzle in position when placed on the ground, distributes the water evenly and in a shower like manner, permits of full flow from nozzle, thus creating no back pressure on the hose, may be shifted without cutting off the water and can be retailed at a moderate price



Crescent Wave Lawn Sprinkler.

The Hubbell Standard Pull Cluster.

The accompanying cut represents a pull cluster offered by Harvey Hubbell, Bridgeport, Conn. The cap of the cluster is a part of the cluster center, which construction is designed to make it more ornamental, substantial and mechanically correct. The chain on each socket is about 4 or 5 inches long, connecting in the center with the coupling rosette. From the bottom of the rosette a single chain about 3 feet long is hung. One pull of the chain will turn on the lights, the next pull will extinguish them. A pull down will turn on all the lights, while a pull to one side will turn on one or more of them. The clusters are furnished with a shade holder only, or with a brass covering tube, shade holder and canopy complete, or with a solid brass stem,



The Hubbell Standard Pull Cluster.

shade and holder and canopy. Different lengths of chain and stem are furnished to accommodate the different hights of ceiling. The cluster is made in 2, 3, 4, 5 and 6 lights, fitted with different styles of bases of any finish desired.

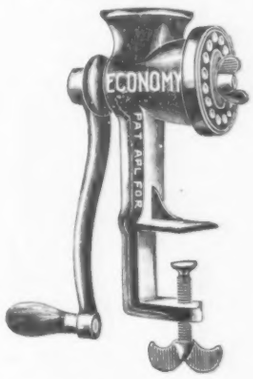
Reissmann's Perfection Sandpaper Holder.

F. Reissmann, West Point, N. Y., is offering the sandpaper holder shown herewith. It consists of a block of wood, 2¾ x 4½ inches in size, with the upper edges nicely rounded. The bottom is covered with a heavy piece of felt. Two heavy wires are pivoted in the ends of the block. The sandpaper is put over the felt and extends up on each side to the top of the block, after which the wires are raised to hold the sandpaper in place. The following advantages of the holder are referred to: That the sandpaper will always be securely held in place by the wire clamps; that heavy felt under the paper will prevent the surface of articles being scratched; that wasting sandpaper is avoided, as it will be left in the holder until completely used up, and that sand or emery paper, from sizes No. 00 to No. 3, can be attached to the holder in less than three seconds. The holder is designed for use by carpenters, cabinet makers, sash, door and blind makers, painters, paper hangers and all other mechanics who use sandpaper, emery paper and emery cloth.

Reissmann's Perfection Sandpaper Holder.

Economy Meat and Food Chopper.

Syracuse Machine Company, Syracuse, N. Y., are putting on the market the Economy meat and food chopper, here illustrated. This utensil is offered as a device for chopping anything that can be cut in a chopping bowl, accomplishing the work in less time as well as



Economy Meat and Food Chopper.

insuring a more even product. The mechanism is very simple, one thumb screw fastening all the working parts together, at the same time being a means of providing the proper tension on the cutting disks, while there is but one nut to remove to separate the parts for cleaning. The manufacturers emphasize the point that this chopper will not crush or tear the food, but cut and chop it, and that it is made of high grade material and tinned. There are four cutting disks, Nos. 1, 2, 3 and 4. No. 1 for fruit, salads and food desired in large pieces; No. 2 for meats and fine cut vegetables; No. 3 for fine cut meat, bread, crackers, coffee, &c., and No. 4 for grating cocoanut, horseradish and similar goods. Other foods within the limits of this chopper mentioned are peanuts, almonds, dried fruit, lemon peel, popcorn, &c. The grating attachment, it is said, gives 480 cuts with one revolution of the handle.

Removable Chair Seat.

W. A. Busse & Co., Chicago, Ill., for whom H. Berkele, 98 Chambers street, New York, is the manufacturers' direct representative, carrying stock and invoicing goods in manufacturers' name, have put on the

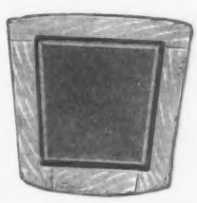


Fig. 1.—Top View of Removable Seat.

Fig. 2.—Method of Fastening to Chair Bottom.

market a patented removable chair seat, two views of which are here shown. Fig. 1 illustrates the top, or visible part of the seat; Fig. 2 showing the under portion and instantaneous method of applying the seat to an old chair in need of recaning. The seat base is hard wood of suitable thickness, upholstered in a fine grade of leatherette and good quality of hygienic cotton felt, the leatherette being carried over the edges and tacked securely to the underside of the seat itself, which is about ½ inch thick complete. When reseating a worn out cane bottomed or other chair, the most inexpert have only to cut out the worn seat, substitute the one here described, which has a nicely tapered edge covering the cane holes and making a good finish, and then bend slightly the four tough wrought steel hooks screwed to the underside of the seat, as seen in Fig. 2, no tools or material being required to complete the work. The seats are made in different styles for various kinds of chairs, and in 12, 14, 15, 16 and 18 inch sizes. The coverings are in black and shades of brown and maroon, in both embossed and pebbled morocco designs scarcely distinguishable from real leather.

Corbin's Duplex New Departure Coaster and Brake.

P. & F. Corbin, New Britain, Conn., and 11-15 Murray street, New York, have recently brought out a more improved form of the Corbin Duplex 1902 model New Departure coaster and brake, as here shown. Fig. 1

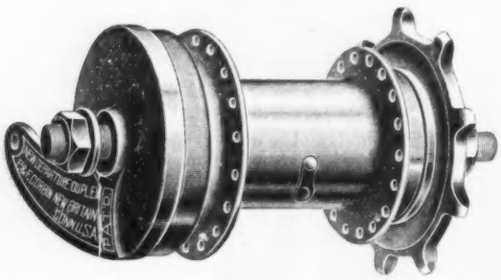


Fig. 1.—Corbin's New Departure Coaster and Brake.

represents it as marketed, Fig. 2 being a sectional cut, with the shell of hub broken away to show the interior and the relation each part bears to the other. Figs. 3 and 4, respectively braking clutch and driving clutch, are marked changes in the brake, intended to give a positive action instead of relying on friction in the

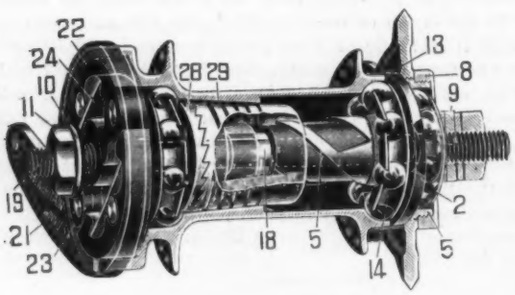


Fig. 2.—Sectional View of Working Parts.

clutches. Fig. 5 shows the arm and cover at the left of the brake, with brake shoes, levers and springs, features that are also entirely new in the brake. By this method of construction, when the clutch is put into operation the action is immediate and positive, but the brake will not set itself as a brake with an expanding spring, but is entirely subject to the will of the rider and controlled absolutely by the amount of pressure applied to the pedals. When pressure is applied to the rear pedal the brake clutch (28) presses against the two levers (23), the levers working in opposite directions and opening the brake shoes (22) in a parallel movement into frictional contact with the interior surface of the brake drum, which retards the speed or stops the bicycle, according to the volume of pressure applied. When the pressure is removed the springs (24) bring the brake shoes (22) back into position automatically. The brake shoes are said to be made of material that will not stick, grind or squeak, and any desired pressure can be exerted on the brake with safety. Some of the points made in favor of this coaster and brake by the makers are that it does not alter the appearance of the wheel, there is no lateral strain or racking of the frame at any time, no "kick off" is required to release the brake and the

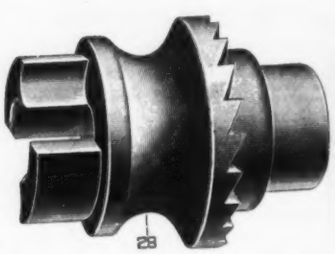


Fig. 3.—Braking Clutch.

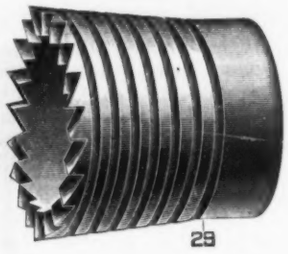


Fig. 4.—Driving Clutch.

wheel can be trundled forward or backward freely. Each bearing is fitted with ball retainers, and it is rain and dust proof. This model of brake is also made for motor cycles.

The Hurwood Machine Screw Driver.

The Acme Mfg. Company, Plantsville, Conn., are offering the screw driver illustrated herewith, which is

The Hurwood Machine Screw Driver.

included in their line of Hurwood tools. A feature of these tools is that the steel extends from the point of the blade through the handle and forms a top for

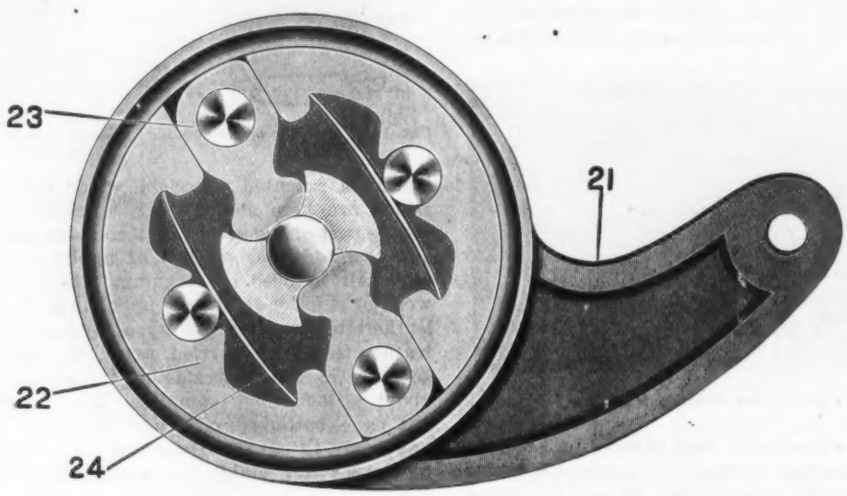


Fig. 5.—Braking Device with Parallel Opening Brake Shoes.

rough use. The entire length of the screw driver shown is 5½ inches, the blade being 1¾ inches long, made of ⅜-inch steel. It is especially adapted for heavy work in places where it is impossible to use a longer driver. It is also recommended for use by linemen.